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Plant pathology division.—*Res. & exp. Rec. Minist. Agric. Nth. Ireland, 1951*, pp. 111–116, 1952.

During 1950 inoculations of potato tubers were carried out in Northern Ireland to determine the ability of species of *Phoma* isolated from potatoes and flax to cause a rot comparable to the gangrene caused by *P. foveata* [C.M.I. map No. 210; *R.A.M.*, 24, p. 384; 25, p. 526]. Only one strain, originally isolated from a shallow surface lesion on a tuber, induced severe rotting, the remainder causing insignificant damage, and it is doubtful whether any are important as crop parasites. While the isolations of *Phoma* sp. causing foot rot of flax [ibid., 28, pp. 173, 288] caused slight rotting of potato tubers, those from potatoes had no injurious effect on flax seedlings grown in soil inoculated with the fungus. There is thus no evidence of any close relation between *Phoma* sp. on flax and those associated with the potato, and only one fungus would seem to be responsible for flax foot rot locally.

Clarke's seedling B. 72 potato was found to be intolerant of and therefore field-immune from virus X.

Examination of 359 samples of oat seed grown in Northern Ireland showed that while seed disinfection with an organo-mercury dust satisfactorily controls *Helminthosporium* [*Pyrenophora*] *avenae* [ibid., 17, p. 809; 31, p. 539] it may not completely control species of *Fusarium* [cf. ibid., 23, p. 258] suspected of causing disease in the field. Scab (*Gibberella zeae*) [cf. ibid., 28, p. 619] on ears of barley in County Down and browning root rot of oats caused by *Pythium* sp. were both new records for Northern Ireland. Contamination by seed-borne parasites of flax seed harvested in the United Kingdom in 1949 was found to be slight; *Botrytis cinerea* [ibid., 28, pp. 173, 185; 31, p. 117] was the most frequent. Flax seed imported from Canada was heavily contaminated with *Alternaria* spp. [ibid., 27, p. 236], but was relatively free from the usual seed-borne parasites. The average figure for germination of this seed tended to be higher when it was mixed and disinfected before distribution.

Advice was frequently given in connexion with the laying down and maintenance of turf where damage by snow mould (*Fusarium nivale*) [*Calonectria nivalis*: cf. ibid., 29, p. 85] and dollar spot (*Sclerotinia homoeocarpa*) [see below, p. 609] was likely to become serious.

New records included cineraria rust (*Coleosporium senecionis*) [cf. ibid., 29, p. 404] and witches' broom of wallflower of [unspecified] bacterial origin [cf. ibid., 1, p. 35]. Severe attacks of apple mildew (*Podosphaera leucotricha*) occurred in the early summer. The wet summer led to severe epidemics of blight (*Phytophthora infestans*) [ibid., 19, p. 41] on potato and to more frequent attacks on tomato. Outbreaks of tomato leaf mould (*Cladosporium fulvum*) and grey mould (*Botrytis cinerea*) [cf. ibid., 23, p. 502; 31, p. 463] were widespread; copper and oil sprays gave the most satisfactory control of both diseases.

Arsić (M.) & Džodić (M.). **Podaci o pojavi nekih bolesti biljaka u župsko-kopaoničkom rejonu u 1951 godini.** [Report on the occurrence of some plant diseases in the Župsko-Kopaonički district in 1951.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 31–34, 1952. [French summary.]

An annotated list is given of the plant-pathogenic fungi found in the Župsko-Kopaonički district of Yugoslavia in 1951. Among the most serious and widespread were *Puccinia pruni-spinosae* [C.M.I. map No. 223], causing a premature leaf-fall of plums, *Clasterosporium carpophilum* [ibid., No. 188] and *Taphrina deformans* [ibid., No. 192] on peach, *Plasmopara viticola* [ibid., No. 221; *R.A.M.*, 31, p. 474] on vine, *Venturia inaequalis* [ibid., 31, p. 334, and below, p. 612; C.M.I. map No. 120] on apple, and *V. pirina* on pear [*R.A.M.*, 31, p. 477]; plum virosis due to *Prunus* virus 7 [cherry mottle leaf virus: cf. ibid., 20, p. 481] is fairly prevalent in this region.

Perišić (M. M.). **Prilog poznavanju parazitne mikoflore okoline Valjeva.** [Contribution to the knowledge of the parasitic mycoflora in the vicinity of Valjevo.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 10, 2, pp. 53–55, 1952. [French summary.]

Among the fungi included in this list of parasitic fungi collected near Valjevo, Yugoslavia, in 1951 are *Phyllactinia corylea* [*R.A.M.*, 18, p. 58] on *Cornus mas*, *Cumminsiella sanguinea* [*Puccinia mirabilissima*] on *Mahonia aquifolium*, *Didymella applanata* [cf. ibid., 27, p. 274; C.M.I. map No. 72] on raspberry, *Oidium erysiphoides* on lilac [cf. *R.A.M.*, 31, p. 552], and *Alternaria zinniae* on *Zinnia elegans* [ibid., 30, p. 521], all very widespread and new to this region, also *Puccinia maydis* [*P. sorghi*: cf. ibid., 30, p. 607] on maize.

Report on the working of the Department of Agriculture, Madhya Pradesh, for the year ending the 31st March, 1949.—32 pp., 1952.

In the section of this report dealing with research and experimental work (pp. 8–17) it is stated that agrosan G seed treatment reduced the incidence of [unspecified] foot rot of wheat in experiments at seven places in Madhya Pradesh, India; of four wheat varieties AO 90 was the least susceptible to the disease. Under the wheat research scheme nine promising lines from the first series of inter-varietal crosses continued to breed true for field resistance to the Indian races of stem rust (*Puccinia graminis tritici*) [cf. *R.A.M.*, 31, pp. 428, 540], the second series also yielding promising hybrids. In a small, preliminary trial these hybrids equalled A115 in yield. Pedigree seed of the rust-tolerant wheats A115, AO 90, NP 52, and NP 101 was supplied to Government farms.

Copper carbonate seed treatment completely controlled juar [sorghum] grain smut [*Sphacelotheca sorghi*: ibid., 29, p. 250; 31, pp. 181, 540]. Of five cotton varieties tested, Buri 107 was the least susceptible to wilt [*Fusarium vasinfectum*: cf. ibid., 30, p. 519]. Of five fungicides used against *Colletotrichum* seedling blight of cotton [*C. capsici*: ibid., 21, p. 363] Baluchistan sulphur was the most effective.

Taylor (C. B.). **The soft-rot bacteria of the coli-aerogenes group.**—*Proc. Soc. appl. Bact.*, 14, 1, pp. 95–100, 1951. [Received May, 1952.]

At the Butterwick Research Laboratories, Welwyn, Herts., a biochemical study was made of eight cultures labelled, respectively, *Bacterium carotovorum* (N.C.T.C. 1975) [*Erwinia carotovora*: *R.A.M.*, 29, p. 502; 31, p. 9], the Guelph D strain and three others of *B. c.* var. *phytophthorum* [strain of *E. carotovora*], one each of *B. c.* var. *solanisaprum* [*E. solanisapra*: ibid., 27, p. 514], *B. c.* var. *melonis*, *B. phytophthorum* [strain of *E. carotovora*], and *B. gypsophilae* (Dowson 179) [ibid., 27, p. 513], and three of *B. aroideae* (including Dowson 66) [strain of *E. carotovora*: ibid., 31,

p. 321]. All except the Guelph D strain of *E. carotovora* and *B. gypsophilae* liquefied pectate gel [ibid., 31, p. 9]. Gelatin liquefaction was usually rapid and infundibuliform or crateriform. *B. gypsophilae*, *E. solanisapra*, and '*B. c.* var. *phytophthorum*' took longer to react; the Guelph D strain was the only non-liquefier.

Of a collection of some 300 old and newly isolated coli-aerogenes bacteria none, except the soft rot organisms mentioned herein, liquefied pectate gel. Excluding the Guelph D strain, *B. gypsophilae*, '*B. c.* var. *phytophthorum*' (N.C.T.C. 6078) and *E. carotovora* (N.C.T.C. 5945) the cultures can be separated into two main subgroups by their methyl red and Voges-Proskauer reactions in glucose-phosphate broth. One group of seven strains resembles *B. aerogenes* type 1 and the other of eight strains resembles Intermediate type 1. Although the soft rot types are coli-aerogenes bacteria in the sense of the definition proposed by the Societies for General Microbiology and for Applied Bacteriology (*Proc. Soc. appl. Bact.*, 1, 3, 1949), they cannot in their present condition be regarded as true coli-aerogenes organisms but possibly rather as paracolon bacteria, since the lactose-fermenting powers of the cultures examined were confined to the production of acid alone or with very small amounts of gas. It is suggested, therefore, that the soft rot types should not be included in the general scheme of classification outlined by the Society for Applied Bacteriology (ibid., 2, 3, 1949) but placed in an Appendix with the following description: coli-aerogenes bacteria, producing soft rots of certain plant tissues; optimum growth temperature 25° to 30° (at which acid is produced); gelatin and pectate gel liquefied; indole not produced; methyl red and Voges-Proskauer reactions positive or negative; citrate may or may not be utilized.

Dye (D. W.). **The effects of chemicals and antibiotic substances on crown-gall (Agrobacterium tumefaciens (Smith and Townsend) Conn). Part IV.**—*N.Z.J. Sci. Tech.*, Sect. A, 33, 5, pp. 104–108, 1 graph, 1952.

In further experiments at the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand, on the effect of chemicals and antibiotics on the crown gall organism (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 31, p. 480] solutions of commercial streptomycin (300 and 1,500 units per ml.), crude streptomycin (equivalent to 20 units per ml.), 20 per cent. methyl salicylate, 1 per cent. acidulated mercuric chloride, 2 per cent. elgetol, 25 per cent. D.N.C. winter wash, saturated copper sulphate and potassium dichromate, and 50 per cent. puratized were injected into or smeared or brushed on French marigold (*Tagetes patula*) stems at the time of inoculation with *B. tumefaciens*, growing galls on *T. patula* plants being similarly treated. Applied at the time of inoculation all the materials prevented gall formation or greatly reduced the number of galls that developed. Applied to growing galls all except streptomycin significantly retarded gall development and killed numerous galls. In both experiments puratized gave complete control with little damage to the plants. Copper sulphate and potassium dichromate when injected into the galls killed the plants. No one method of application was invariably superior to the others.

Manil (P.) & Straszewska (Z[ofia]). **Désintégration de Agrobacterium tumefaciens par les ultrasons. Absence d'action tumorigène chez les produits obtenus.** [Disintegration of *Agrobacterium tumefaciens* by ultrasound. Absence of tumorous activity in the products obtained.]—*Bull. Inst. agron. Gembloux*, 19, 3–4, pp. 395–396, 1951. [Received June, 1952.]

Previous experiments in 1950 in collaboration with Philips Laboratories, Eindhoven, demonstrated that suspensions of the crown gall organism (*Agrobacterium* [*Bacterium*] *tumefaciens*) lost their activity after filtration through a Chamberland

L_3 candle, the filter having apparently absorbed the active substance as well as the bacteria. In further experiments in 1951 submission of a heavy suspension of the bacterium plus a small quantity of ether to ultrasound waves (at the Pasteur Institute, Paris) of a frequency of 960,000 for three hours gave negative results. The addition to the resulting preparation of merthiolate immediately, or to the supernatant after centrifugation, or passage through a Chamberland L_3 candle all prevented tumour development in *Datura* and tomato plants treated with the products, whereas filtration through a collodion membrane did not. The results appear to support the conclusions of other workers that crown gall does not result entirely from the action of the metabolic products of the bacterium but from a disturbance of the equilibrium between various factors in which the bacterium plays an essential part.

DE CAPITE (L.). **Action du paraaminophenylsulfamide et de l'acide paraaminobenzoïque sur le parenchyme vasculaire de Topinambour et sur les tissus de crown gall de Scorsonère cultivés in vitro.** [Action of *p*-aminophenylsulphamide and of *p*-aminobenzoic acid on the vascular parenchyma of Jerusalem Artichoke and on the crown gall tissues of *Scorzonera* cultured *in vitro*.]—*C. R. Acad. Sci., Paris*, 234, 25, pp. 2478–2480, 1 graph, 1952.

The addition to tissue cultures of Jerusalem artichoke [*Helianthus tuberosus*] of *p*-aminobenzoic acid led to increased growth (optimum dilution 10^{-4}), whereas *p*-aminophenylsulphamide retarded their development, except at very low concentrations, which were slightly stimulatory. Mixtures of the two demonstrated a clear-cut mutual antagonism, the toxic action of the sulphamide, which was very pronounced at 10^{-4}, being suppressed to an increasing extent by *p*-aminobenzoic acid at rising dosages. *Scorzonera* tissues infected by crown gall [*Bacterium tumefaciens*: *R.A.M.*, 31, p. 544] responded similarly to the foregoing in the presence of the two antagonists.

MACHACEK (J. E.) & WALLACE (H. A. H.). **Longevity of some common fungi in cereal seed.**—*Canad. J. Bot.*, 30, 2, pp. 164–169, 5 graphs, 1952.

During a ten years' investigation at the Dominion Laboratory of Plant Pathology, Winnipeg, of the longevity of some common fungi in cereal seed most of the 11 lots of wheat, four of oats, and seven of barley seed samples stored in Manila paper envelopes in a loosely covered metal box in a dry unheated shed for that time were found to be free from viable fungi at the end of the storage period and still retained their germinability. The rate of decline of *Alternaria tenuis* initially infecting the wheat varieties Pentad, Renown, and Mindum, Vanguard oats, and Hannchen barley was similar, i.e., fairly rapid on all three types, though while the fungus disappeared completely from oats after 10 years, wheat and barley still contained 1·6 and 0·6 per cent. infection. A similar rate of decline occurred with *Helminthosporium sativum* both in wheat (Pentad and Regent heavy infestation, Renown and Mindum moderate) where it lived for nine years, and barley (Charlottetown 80 heavy, Hannchen moderate) where at the end of 10 years there was still 1·7 per cent. of seeds infected. Reduction of *Septoria nodorum* in wheat (Thatcher and Red Fife) was more rapid during the first year of storage, the fungus dying out completely after seven years. *H.* [*Pyrenophora*] *avenae* in oats (Erban and Banner) and *H. teres* in barley (O.A.C. 21) lost their viability slowly, the former increasing during the first five and the latter during the second and third years of storage; a definite decline followed thereafter but at the end of 10 years there was still 10 per cent. infection of the former and 3·1 per cent. of the latter. Most of the micro-organisms associated with these two fungi in infested kernels were by then dead and they could generally be recovered in pure culture.

Gordon (W. L.). **The occurrence of Fusarium species in Canada. II. Prevalence and taxonomy of Fusarium species in cereal seed.**—*Canad. J. Bot.*, 30, 2, pp. 209–251, 4 figs., 12 pl. (11 col.), 1952.

A total of 16 species and varieties of *Fusarium*, classified in nine sections of the genus [*R.A.M.*, 24, p. 143], was isolated from cereal seed during an examination at the Dominion Laboratory of Plant Pathology, Winnipeg, of wheat, barley, and oats from the eastern seed inspection districts (402, 513, and 636 samples, respectively) and western (1,177, 529, and 516 samples, respectively). Approximately 41·8 per cent. of the wheat samples (1·5 per cent. of the kernels), 76·2 per cent. of barley (3·9), and 79·6 per cent. of oats (5·7) from the former district and 13·8 (0·2), 36·3 (0·2), and 38·9 (1·1) per cent., respectively, from the latter yielded *Fusarium*. Apart from those species already mentioned [loc. cit.], the following were also found: *F. arthrosporioides* [ibid., 17, p. 250; 31, p. 493] (one isolate), *F. semitectum* [ibid., 12, p. 317] (one isolate), *F. acuminatum* [ibid., 16, p. 398] (less than 1 per cent.), *F. sambucinum* var. *coeruleum* = *F. s.* f. 1 (*Gibberella pulicaris* var. *minor*) [ibid., 24, p. 143] (4 isolates), *F. lateritium* (*G. baccata*) [ibid., 6, p. 599] (one isolate), *F. solani* (*Hypomyces solani*) [ibid., 17, p. 168] (two isolates), *F. dimerum* [ibid., 22, pp. 405, 406] (from cereal soil only), and *F. merismoides* [loc. cit.] (cereal soil), as well as four new combinations: *F. oxysporum* var. *redolens* (for *F. redolens*) [ibid., 22, p. 58], *F. compactum* (for *F. scirpi* var. *compactum*), *F. lateritium* f. *cajani* (for *F. l.* var. *cajani*), and *F. l.* f. *crotalariae* (for *F. udum* var. *crotalariae*) [ibid., 20, p. 496]. *Calonectria nivalis* [ibid., 19, p. 83] was not encountered.

Oswald (J. W.) & Houston (B. R.). **The greenbug, Toxoptera graminum Rond., a vector of cereal yellow-dwarf virus.**—*Plant Dis. Reptr*, 36, 5, pp. 182–183, 1952. [Multilithed.]

In greenhouse studies at the California Agricultural Experiment Station, Davis, *Toxoptera graminum* was found to be a vector of the cereal yellow dwarf virus [*R.A.M.*, 31, p. 233], giving a 37 per cent. transmission rate (to Blackhulless barley), which was higher than for *Macrosiphum dirhodum*, but considerably lower than for *M. granarium*, *Rhopalosiphum maidis*, and *R. prunifoliae* [loc. cit.].

Rosser (D.). **Spica—a new Wheat variety.**—*Qd agric. J.*, 75, 1, pp. 1–5, 3 figs., 1952.

A newly released wheat variety, Spica (TS.K.PF–4601), developed in Queensland, the final cross being made in 1934 between an unfixed hybrid (Three Seas × Kamburico) and an unnamed hybrid selection (Pusa × Flora 3202) has in field tests since 1946 so far remained virtually immune from stem rust [*Puccinia graminis*: *R.A.M.*, 29, p. 610; 31, pp. 482, 546] in the mature plant stage. Resistance was unaffected by the appearance of new races of stem rust in 1949–50, which attacked hitherto resistant varieties, including Yalta, Kendee, Charter, and Gabo [cf. ibid., 30, p. 558 and next abstract]. Spica also has some resistance to leaf rust [*P. triticina*: loc. cit.]. In three years' tests against all the best available varieties in its own (i.e. quick-maturing) class Spica yielded well, its yield being as impressive in the very wet year 1950 as in the dry season of 1951. It is liable to frost damage.

Walker (A. J. K.). **Trials with a new chemical for bunt control.**—*J. Dep. Agric. S. Aust.*, 55, 11–12, pp. 548–550, 1952.

In trials for the control of wheat bunt [*Tilletia caries*: *R.A.M.*, 29, p. 150] at two Seed Wheat Farms in South Australia the effectiveness of hexachlorobenzene (HCB) [ibid., 31, p. 110] was compared with the usual seed treatments. Wheat grain (2lb.) from varieties under trial was evenly infected with bunt spores and

small samples then treated. A new bunt-resistant variety, Orfed×Dirk 48 (3), produced by the back-crossing technique at the Waite Agricultural Institute, combining the resistance to stem rust [*Puccinia graminis*: ibid., 31, p. 109 and preceding abstract] of Gabo and bunt resistance of Orfed with the general features of Dirk [ibid., 28, p. 622], was included but given no treatment.

In 1950–1 the mean percentage of infected plants at the Turretfield and Minnepa Farms using, respectively, the Sword and Gluyas varieties was 0·9 and 6·4, respectively, for copper carbonate, none at either place for both 11 per cent. HCB and mercurial 'A', and 0·3 at the former for mercurial 'B', as against 50·9 and 89·2, respectively, for the controls. In the 1951–2 trials with Gabo which sustained when untreated 76·4 and 91·7 mean percentage infection at the two farms, respectively, the figures for the resistant Orfed×Dirk were 3·5 and 0, with 5·5 and 1·4 for 30 per cent. HCB, the only one of the treatments to give a low percentage, which for all the other treatments ranged from 13·3 to 54·8 and 9·8 to 53·7, respectively. The mean percentage of infected heads was nil for all treatments in the 1950–1 trial at Turretfield, and 11·8 for the control. In the next season the figures were 0·5 (Orfed×Dirk), 2·7 (HCB), and ranging from 9·9 to 48·4 for all other treatments, as against 69·7 for the control. According to the 1951–2 results the germination was not affected by any of the treatments used and the total number of heads formed did not vary with the treatment. HCB was shown to be equal to or more effective and more economical than either organic mercurial compounds or copper carbonate and is justifiably recommended for the protection of wheat from bunt attack.

Bell (G. D. H.) & Lupton (F. G. H.). **Yellow rust in Wheat. Its significance in Wheat cultivation and breeding in England.**—*J. Minist. Agric.*, 58, 12, pp. 572–576, 1952.

Seedling tests conducted at the Plant Breeding Institute, School of Agriculture, Cambridge, with 42 wheat varieties, mostly French or Continental, and six physiologic races of *Puccinia glumarum* [cf. *R.A.M.*, 29, p. 609; 31, pp. 109, 110, 111] showed that the varieties Bersée, Druchamp, and Jubilegem were susceptible to all the races used. Franc Nord, Nord Desprez, and Petit Quin Quin were susceptible to certain races but resistant to others. Libérateur, Marival, and Soissonnais were resistant to all the races.

Before the inoculation tests on varieties had been carried out, a cross had been made between Holdfast, which displays considerable mature-plant resistance in the field but is seedling-susceptible to all six races, and Jubilegem, susceptible in both stages. During the early generations little natural infection occurred, but in the fourth generation in 1949 heavy infection began at the end of April. Field observations corroborated the seedling inoculations in that all resistant seedlings remained resistant throughout development, while some susceptible ones became resistant later. The results obtained in the following year when rust developed much later were largely corroborative. But in 1951 heavy natural infection developed and all except two of the previously resistant lines were severely attacked in the mature plant stage, indicating the presence of a race of yellow rust to which the plants had not before been exposed.

A new series of hybrids was exposed in its second generation (1951) to the late natural infection. On 14th July counts showed that W. 298/5A hybrids with Jubilegem, Soissonnais, and Druchamp, and W. 298/6A with the same three had, respectively, 75·7, 8·5, 32·3, 36·7, 18·5, and 20·6 per cent. infection. The figures for the parent varieties, Jubilegem, Soissonnais, Druchamp, W. 298/5A, and W. 298/6A, were, respectively, 72·8, nil, 8·2, 48·4, and 24·2 per cent. These figures indicate a very close relationship between the behaviour of the F_2 populations and the rust reaction of their parents.

Utrotning av Berberisbusken. [Eradication of the Barberry bush.]—*Flygbl. Växtskyddsanst.* 96, 4 pp., 1 col. pl., 1952.

Black rust of cereals (*Puccinia graminis*) occupies a prominent place among the economically important plant diseases of Sweden [*R.A.M.*, 9, pp. 98, 633], and in 1951 it was responsible for heavy losses in the wheat crops. The function of barberries in the life-history of the pathogen is briefly explained and directions given for their eradication by mechanical or chemical methods [cf. ibid., 31, p. 234]. Common salt, which is obtainable cheaply from tanneries, and chlorex containing sodium chlorate may be used for this purpose. Clearing the ground by means of tractors or other modern equipment may be useful in certain circumstances, but no fragments of roots should be left and periodical inspections of the site are required for several years.

The barberry eradication law of 1933 [ibid., 13, p. 84] is still in force, with amendments introduced in 1944 and 1950.

James (N.) & Lejeune (A. R.). **Microflora and the heating of damp stored Wheat.** —*Canad. J. Bot.*, 30, 1, pp. 1–8, 1952.

In studies at the University of Manitoba, Winnipeg, damp wheat was induced to heat spontaneously under adiabatically controlled conditions simulating natural storage. Heating and bin-burning were associated with many species of mesophilic bacteria and fungi [*R.A.M.*, 31, p. 112] normally present on the grain. After ten days' commercial storage at 23° and 37° C. the numbers of fungi isolated on Czapek's agar were 22,000 and 100, respectively, and 20,000,000 and 1,270,000, respectively, after 56 days. None developed at 50° during similar periods. Under adiabatic conditions the numbers for the three temperatures, respectively, were for wheat with a 19·17 per cent. moisture content 46,000, 37,000, and 4,300; for 21·77 per cent. moisture they were 460,000, 1,000,000, and 200,000. At higher moisture contents none developed. The species isolated included *Penicillium melinii, P. viride-dorsum, Mucor* sp., *Aspergillus fumigatus* [ibid., 26, p. 51], and *Streptomyces* sp. In natural storage although the grain shows evidence of increased combustion, most of the heat is dissipated, so that the temperature does not rise sufficiently high for thermophilic fungi and bacteria. If the temperature in isolated pockets in the mass rises high enough, the thermophiles are probably the result of the high temperature rather than the cause.

Wu (Y. S.). **Production of stem-rust sori on albino Barley.**—*Phytopathology*, 42, 4, pp. 177–178, 1 fig., 1952.

At the Department of Field Husbandry, University of Saskatchewan, Saskatoon, albino barley seedlings (*Canad. J. Res.*, Sect. C, 24, pp. 145–157, 1946) in 0·3 mol. sucrose solution were inoculated with an unknown race or races of *Puccinia graminis tritici*. Numerous uredosori developed, smaller than those formed on variegated [loc. cit.] and normal green leaves. None was produced on inoculated albino seedlings without sucrose. The colour, size, and germination percentages of the uredospores were similar on all plants and the uredospores produced on the albino plants were pathogenic to normal green ones.

In a parallel experiment one series of plants was kept in the greenhouse and another in total darkness, except for a 15- to 20-minute period every two days, when a 25-watt light was put on while the sucrose and mineral salt solutions were supplied. In both the uredosori developed seven days after inoculation with a uredospore suspension. In a single test the addition of 0·1 per cent. yeast extract to the sucrose solution accelerated the appearance of the rust pustules.

Russell (R. C.). **Diseases of Barley and their control.**—*Agric. Inst. Rev.*, 7, 2, pp. 35–36, 2 figs., 1952.

Essential information on barley diseases and their control in Canada, including loose smut (*Ustilago nuda*) [*R.A.M.*, 31, p. 485 and following abstracts], is summarized in popular terms.

Clark (F. S.). **The development of an isolated area for the production of smut-free Barley seed.**—*Agric. Inst. Rev.*, 7, 2, pp. 37–38, 1 fig., 1952.

At the annual meeting four years ago of the Barley Improvement Committee of Saskatchewan, serious consideration was given to growers' reports of the increasing prevalence of loose smut (*Ustilago nuda*) [see preceding and next abstracts] in the main malting barley area of the Province, coinciding with the introduction of the susceptible Montcalm variety. Co-operation between the Barley Improvement Institute, the Agricultural Engineering Department of the University of Saskatchewan, and the Dominion Laboratory of Plant Pathology resulted in the construction of a machine for seed treatment by the hot-water method [*R.A.M.*, 31, p. 52]. Half-bushel lots of seed are placed in a two-bushel, loosely woven jute bag, which after soaking for five hours at 70° F. is attached to an endless belt that passes slowly (in 11 minutes) through a tank of water heated to 126° [cf. ibid., 30, p. 103]. It is then immersed in cold water for a few minutes, drained on a rack for a short time, and spread over the wire-covered openings in the top of a drier in the shape of a rectangular trough, 20 by 2 by 2 ft. Air controlled to 95° is forced into the trough and up through the seed. The capacity of the treating unit is 30 bush., and of the drier nine bush. per hour, and the fee for the service has been maintained at $1.00 per bush.

During the winter of 1949 to 1950 a total of 1,107 bush. registered and élite Montcalm seed barley was treated. The severe August frost of 1950 damaged all but one of the subsequent crops (sown extremely early). Embryo tests [ibid., 31, p. 485] showed that some reinfection occurred in all except the early-sown, which was past flowering before spores developed in the surrounding untreated fields. The problem of isolation in the production of large quantities of smut-free seed was solved by special legislation, resulting in the establishment of a seed control area covering 170 sections of the district or some 300 farms. The very wet autumn of 1951 necessitated leaving about one-third of the seed produced by the treated crops in the field until the following spring, but sufficient should be available to give the required isolation to registered growers. To date some absolutely smut-free barley and a large quantity virtually so have been produced by these methods. An embryo test conducted on 39 fields grown from treated seed and from the field surviving the 1950 frost revealed 0 to 1·1 (average 0·5) per cent. reinfection as compared with 2·5 to 3·4 per cent. in untreated areas in the Kelvington district.

Tyner (L. E.) & Russell (R. C.). **Control of loose smut in Barley by tetrachloro-para-benzoquinone (spergon-SL).**—*Plant Dis. Reptr*, 36, 5, pp. 180–181, 1952. [Multilithed.]

In further experiments in 1951 on the control of barley loose smut [*Ustilago nuda*: *R.A.M.*, 30, p. 605 and preceding abstracts] a 48-hour immersion of infected seed in 0·2 per cent. spergon-SL at 72° to 75° F. after soaking for 10 hours in water gave complete control in the varieties Newal, Montcalm, Plush, and Glacier at the Dominion Laboratory of Plant Pathology, Edmonton, Alberta. Six hours in water and 48 in spergon-SL at 72° reduced infection to 0 to 0·1 per cent. in Montcalm, Newal, and Warrior at Saskatoon, and the same water soak plus 50 hours in spergon at 50° to 72° reduced it to 0·05 per cent. in Montcalm at Winnipeg. A serious

reduction in stand from damage [due to treatment] occurred in Glacier at Edmonton and Montcalm (frosted) at Saskatoon.

Richards (F. J.) & Coleman (R. G.). **Occurrence of putrescine in potassium-deficient Barley.**—*Nature, Lond.*, 170, 4324, p. 460, 1952.

During an investigation, by means of paper chromatography, at the Imperial College of Science and Technology, London, it was established that putrescine is produced and accumulates in barley in more than trace amounts under certain conditions of potassium deficiency [*R.A.M.*, 29, p. 229], i.e., in potassium-deficient plants not supplied with either sodium or rubidium, and that some of the observed symptoms may be attributed directly to its presence. In barley plants where it was detected, putrescine was present from an early age and increased in quantity as the external symptoms of deficiency became acute, its concentration in dead potassium-deficient leaves being quite high. Treating partially cut leaves of high-potassium plants with putrescine resulted in toxic effects resembling closely some of the symptoms found in potassium-deficient barley. Tillers remote from the one receiving the compound may react similarly, distal parts of the leaves then being especially affected, but the toxic symptoms induced by the free base differed somewhat from those developed where the hydrochloride was supplied.

Arny (D. C.). **The bioassay of ceresan M on treated Oat kernels.**—*Phytopathology*, 42, 4, pp. 222–223, 1952.

At the University of Wisconsin, Madison, Leben and Keitt's bioassay method [*R.A.M.*, 30, p. 279] was adapted for tests on 20 samples of oat grains treated with ceresan M [ibid., 31, p. 546] in three dusting and two slurry machines [ibid., 30, p. 424] in order to determine the accuracy of application. Most of the samples from the former carried much less than the prescribed 0·5 oz.; the number of samples of the latter was too small to permit of a definite conclusion as to their accuracy. One of the possible reasons for the frequency of under-treatment is the existence in the dusting machines of inherent defects, such as irregularity in the flow of dust and seed, difficulties in the precise calibration of the dust dispenser, and removal of dust by the exhaust fan. Thus, in one machine the exhaust fan was found to be withdrawing one-half to two-thirds of the dust as the seed left the mixing chamber. This assay method appears to give an adequate appraisal.

Earhart (R. W.) & Shands (H. L.). **Oat varietal responses to infection by Helminthosporium avenae Eid.**—*Agron. J.*, 44, 5, pp. 234–238, 3 figs., 1952.

At the Wisconsin Agricultural Experiment Station in 1948–9, 173 oat varieties and selections, representing eight species of *Avena*, were tested in the greenhouse for seedling response to inoculation with *Helminthosporium* [*Pyrenophora*] *avenae* [*R.A.M.*, 29, p. 353; 30, p. 145] either by germinating the seeds in contact with the pathogen or spraying the foliage of one-month-old plants with aqueous suspensions of macerated mycelium and conidia. In the field 145 varieties and selections were tested in 1949 by four methods of leaf inoculation, all of which gave similar results.

Most of the common varieties were relatively resistant to the seedling infection stage of the blight. Two selections, Bl–47–67 and Bl–47–79 (Coker's Pedigreed Seed Company, Hartsville, South Carolina), showed the least infection in all the tests. Using a scale of 0 to 10 (no infection to very heavy) their disease indices in the greenhouse seedling tests were 0·7 and 0·7, respectively, in foliage tests 1·2 and 2·5, and in the field 1·7 and 4·5. Highly resistant also were Bl–47–93 (0·7, 2·5, and 3, respectively) and Wisconsin hybrid X279–1 (1·5, 1·2, and 2). Although there was a wide range in reaction from these resistant selections on the one hand to the highly susceptible (index 10) Kareela and Victoria [ibid., 31, p. 539] (*A. byzantina*)

varieties on the other, no clear-cut line of demarcation could be drawn between the different classes. The average disease indices of all varieties and selections in the greenhouse (seedling and foliage) and field tests were 2·6, 4·8, and 6, respectively. Apart from such selections as Bl–47–67 or X279–1, very few of the varieties used in these experiments showed sufficient resistance to qualify for inclusion in the breeding programme.

Livingston (J. E.). **Injury and drying of seed Corn in relation to emergence.**—*Phytopathology*, 42, 4, pp. 221–222, 1952.

In recent tests at the University of Nebraska, Lincoln, to determine the role of injuries in the enhancement of susceptibility to infection by soil-borne fungi in maize grain dried artificially at 105° F. [*R.A.M.*, 20, p. 57], ears from cross WF9 × M14 were collected three and six weeks after pollination. Half were dried at 105° until the moisture content was reduced to about 12 per cent. and half in an open room at 25° to 30° C. One-third (*a*) received no further treatment, a second lot (*b*) was injured by peeling a strip of pericarp 2 to 3 mm. wide from over the embryo, and third (*c*) by a similar operation over the endosperm. The seed, planted in non-sterile, composted soil, was kept at 20° for 48 hours, after which half was maintained at 5° for five days and then returned to the greenhouse at 20°, while the remainder was retained at the latter temperature throughout.

In the naturally dried series, the emergence percentages of the seed collected three weeks after pollination and held continuously at 20° were as follows: (*a*) 99·2, (*b*) 59·2, and (*c*) 81·7, the corresponding figures for the six-week material being 96·7, 58·3, and 88·4. For the seed kept at 5° for five days the emergence percentages of the three- and six-week lots were (*a*) 82·5 and 89·2, (*b*) 18·3 and 15·7, and (*c*) 45 and 46·7, respectively; in the artificially dried series held continuously at 20° the figures were (*a*) 64·2 and 90·8, (*b*) 3·8 and 21·7, and (*c*) 28·3 and 48·4, respectively, and in those maintained at 5° for five days 30 and 74·2, 0·8 and 9·2, and 5 and 11·7, respectively.

It is apparent from these results that the reduction in emergence was much heavier in grain injured over the embryo than over the endosperm. Injuries were, however, only partly responsible for the losses, susceptibility to soil pathogens evidently being conditioned to some extent by physiological differences between the artificially and naturally dried grain. Maturity at harvest time and preliminary cold treatment were other contributing factors in stand reduction.

Bottomley (R. A.), Christensen (C. M.), & Geddes (W. F.). **Grain storage studies. X. The influence of aeration, time, and moisture content on fat acidity, nonreducing sugars, and mold flora of stored yellow Corn.**—*Cereal Chem.*, 29, 1, pp. 53–64, 1952.

In further studies on maize storage at the Minnesota Agricultural Experiment Station [*R.A.M.*, 30, p. 316] the authors found that in aerated samples of No. 1 yellow dent kept at 30° C. at moisture levels of 19, 24, 27, and 31 per cent. the mould counts and fat acidity tended to increase with rising moisture content and prolonged time of storage, while viability and non-reducing sugars decreased. The numbers and kinds of moulds, however, differed fairly widely in duplicate trials, diverse species predominating at various storage intervals and moisture contents. Decreases in non-reducing sugars corresponded more closely to mould incidence than did increases in fat acidity. The growth of *Aspergillus glaucus* appeared to cause a rapid loss in non-reducing sugars and little increase in fat acidity, whereas the development of *A. flavus*, *A. candidus*, *Penicillium* sp., and *Fusarium* sp. was commonly accompanied by a marked increase in fat acidity.

In non-aerated samples certain moulds, especially *Cephalosporium* sp., continued to increase in the samples stored at 31 per cent. moisture, even when the oxygen

content of the inter-seed atmosphere had sunk almost to zero and the carbon dioxide concentration exceeded 30 per cent. Under these conditions fat acidity remained relatively constant and was a poor index of grain damage. It is concluded from these observations that spoilage of high-moisture grain cannot be altogether prevented by storage in hermetically sealed containers.

CASSIN (J.). **Expériences sur l'action fongicide de différents produits pour la lutte contre la moisissure des Agrumes.** [Experiments on the fungicidal efficiency of various products for the control of Citrus mould.]—*Fruits Prim. Afr. N.*, 22, 232, pp. 18–20, 1 graph, 1952.

Two experiments were carried out in Algeria to determine the efficiency of various materials in controlling citrus rot caused by *Penicillium digitatum* and *P. italicum* [*R.A.M.*, 27, p. 320; 31, p. 431 and next abstract]. In the first, five lots of soft-skinned Portuguese oranges grown at the Experiment Station, Boufarik, and damaged by hail were given the following treatments: (*a*) none, (*b*) three minute soak in a 0·2 per cent. solution of 2, 4–D at 25° [C.], (*c*) soaked in eau de Javelle (2 l. of the commercial product per hl.) for the same time at 46°, (*d*) soaked in a 5 per cent. sodium borate solution for five minutes at 46°, and (*e*) packed in a box lined with diphenyl-impregnated paper [ibid., 31, p. 543]. In the second test the treatments for Portuguese oranges obtained from the Citrus Co-operative, Boufarik, were: (*a*) none, (*b*) soaked in 3 per cent. sodium borate solution plus 0·5 per cent. sodium hydroxide for three minutes at 25°, (*c*) soaked in 2·5 per cent. sodium borate plus 0·25 per cent. thymol, 2 l. alcohol, and 2 l. formalin per 100 l. of solution, for five minutes at 25°, (*d*) soaked in 2·5 per cent. sodium bicarbonate, 0·5 per cent. sodium hydroxide, 2 l. alcohol, and 2 l. formalin per 100 l., and (*e*) as in the first test. In both tests the fruit was spread out for 24 hours after treatment, packed, then opened after 15 days.

The percentages of rotted fruit in the two tests, respectively, were: (*a*) 36 and 24, (*b*) 54·6 and 22, (*c*) 28·4 and 20, (*d*) 23·3 and 15, and (*e*) 7·3 and 7·5. The diphenyl-treated paper was unquestionably the most effective method of control since it reduced losses by 25 to 30 per cent. The cost of employing this method may be reduced in the future by manufacturing the paper locally. At the rate employed 2, 4–D appeared to favour the growth of *Penicillium*.

NADEL-SCHIFFMAN (MINA). **Une contribution à la pathogénie du Penicillium digitatum et du Penicillium italicum sur les fruits des Agrumes.** [A contribution to the pathogenicity of *Penicillium digitatum* and *Penicillium italicum* on Citrus fruits.]—*Rev. Path. vég.*, 30, 4, pp. 228–231, 1951. [Received March, 1952.]

Quantitative studies were made at Rehovot, Israel, each year from 1946 to 1950 during November to April on *Penicillium digitatum* and *P. italicum* [*R.A.M.*, 28, p. 64; cf. preceding abstract] on Jaffa (Shamouti) and Valencia oranges, shaddocks [*Citrus maxima*], and lemon fruits, fallen or placed on the ground and in the market two to five weeks after picking. Fallen fruit in orchards on light soil was attacked more severely by *P. digitatum*, while on heavy soil *P. italicum* was more troublesome. Spore masses of this fungus originated from *Phytophthora* infections [see next abstract]. The total incidence of both species is greater at the end of the season in April than at the beginning (November to December), *P. digitatum* being more prevalent at first and *P. italicum* later. The former species seems more virulent than the latter. Generally, *P. italicum* begins to develop at the point of contact with the soil, whereas *P. digitatum* mostly attacks the rest of the surface. A second generation of spores of *P. digitatum* arises on the same fruit, but this phenomenon was never observed with *P. italicum*.

Nadel-Schiffman (Mina). **L'influence de la température et de la pluviosité sur l'apparition des différentes espèces de Phytophthora.** [The effect of temperature and rainfall on the incidence of various *Phytophthora* species.]—*Rev. Path. vég.*, 30, 4, pp. 232–237, 6 graphs, 1951. [Received March, 1952.]

Studies at Rehovot, Israel, on the *in vitro* requirements of *Phytophthora hibernalis*, *P. parasitica*, and *P. citrophthora* causing brown rot of citrus [*R.A.M.*, 29, p. 616; 31, p. 380 and next abstract], and their season of development in the field demonstrated that the usual field temperatures ranging from a minimum of 7° to 8° C. in January to February to 25° in November to April, were the ones most favourable for the development of *P. citrophthora*, the most destructive pathogen of the fruits. They also favoured the incubation period, which in fruit artificially inoculated through wounds is four to six days from 15° to 30° and nine to 15 days at about 10°. The temperature requirements *in vitro* compared with those prevailing during the season also explain why *P. parasitica* occurs naturally only at the beginning and end of the fruit season and *P. hibernalis* only during the brief period of low temperatures. Although their incubation periods at the optimum temperature are as short as that of *P. citrophthora*, they do not give rise to epidemics.

The degree of rotting by all species is directly dependent on the quantity and distribution of rainfall during the season. Generally, infection is greatest on fruit growing near the ground.

Moreau (C.) & Moreau (Mireille). **Phytophthora parasitica Dastur. Gommose. Pourriture brune des Agrumes.** [*Phytophthora parasitica* Dastur. Gummosis and brown rot of Citrus.]—*Rev. Mycol.*, 16, *Suppl. colon.* 2, Fiche 5, 7 pp., 2 figs., 1951. [Received April, 1952.]

Notes are given on the nomenclature, geographical distribution, host range, symptoms, morphology, biology, transmission, and control of *Phytophthora parasitica* on citrus [see preceding abstract].

Orshanskaya (Mme V. N.). Некоторые итоги изучения культур гриба **Deuterophoma tracheiphila Petri** и перспективы их использования в борьбес болезнью усыхания Цитрусовых—"мальсеко". [Some results of a study of cultures of the fungus *Deuterophoma tracheiphila* Petri and some aspects of their application to the control of wilt disease of *Citrus*—'mal secco'.] Изв. Акад. Наук СССР. [*U.S.S.R. Acad. Sci. News = Bull. Acad. Sci. U.S.S.R.*], *1952*, 1, pp. 89–100, 16 figs., 1952.

In a series of experiments in 1950 at Adzharia and in 1951 at the Central Laboratory for Quarantine of Agricultural Plants, Moscow, U.S.S.R., fresh culture filtrates of *Deuterophoma tracheiphila* [*R.A.M.*, 30, p. 413] were toxic to young shoots of tomato and lemon; even after eight months' storage at room temperature (16° to 18° C.) in the dark they were toxic to *Cyperus* shoots. Wilting of tomato leaves, which was exceptionally rapid, occurred within 45 minutes, compared with the normal 24 to 48 hours for a cut shoot left out of water, and two hours for lemon in the filtrate. Drooping of *Cyperus* crown leaves began after six hours and all leaves were hanging at an acute angle after 21 hours, progressive and rapid rolling and withering of the leaves ensuing. Drooping of the leaves of old *Cyperus* shoots occurred after 24 hours in both sterile and non-sterile filtrates from month-old cultures of *D. tracheiphila* on purely synthetic (Czapek) media, and after 30 hours the leaves were at acute angles with the stalk, shrivelling and drying being complete after 46 hours. Ether extracts from cultures on rice grains and fresh mycelial mats on liquid synthetic media proved toxic to *Cissus antarctica* plants. The leaves and tendrils of the young off-shoots dried up within two days, and of mature plants after three. Potato glucose and Czapek glucose agars were both highly

favourable to crystal formation as well as to fungal development, while Waksman's acid liquid and agar were favourable to crystal formation only. In general, the older the culture the more abundant was crystal precipitation both in liquid and solid media and the crystals varied from reddish or bright orange to reddish brown according to their size and the composition of the agar medium. A definite colour reaction, reddish to orange or blue to violet, was observed in the pigment developing in pure cultures on various artificial and natural media when certain reagents were applied. It is hoped that the same technique will give similar colour reactions in living, producing lemon trees for an early diagnosis of the wilt disease.

Wellman (F. I.). **Peligro de introducción de la Hemileia del Café a las Américas.** [The risk of introduction of the Coffee *Hemileia* into the Americas.]—*Turrialba*, 2, 2, pp. 47–50, 1952.

In this paper, presented at the Second Latin-American Conference for Phytogeneticists and Phytopathologists, held at São Paulo, Brazil, from 31st March to 8th April, 1952, the author describes the history, symptoms, biology, distribution, and dissemination of *Hemileia vastatrix* on coffee [*R.A.M.*, 31, p. 15] and the damage incurred in various parts of the world with particular reference to Ceylon [ibid., 23, p. 350]. He reiterates the warnings given by other workers [listed] regarding the danger of its introduction into tropical America, urges the need for more stringent quarantine regulations regarding the introduction of live plants, and reviews the control measures employed in various parts of the world [ibid., 30, p. 366], and work on the production of resistant varieties [ibid., 29, p. 209] with a view to countering the disease should it occur in America.

Kišpatić (J.), Lušin (Vera), & Klindić (O.). **Tretiranje sjemena Pamuka formalinom i sumpornom kiselinom.** [Treatment of Cotton seeds with formalin and sulphuric acid.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 10, pp. 3–8, 1952. [English summary.]

In laboratory experiments at the Institute for Plant Protection, Zagreb, Yugoslavia, cotton seeds were treated with formalin and sulphuric acid against cotton blight [blackarm] (*Bacterium* [*Xanthomonas*] *malvacearum*) [cf. *R.A.M.*, 27, p. 95; C.M.I. map No. 57]. They were then washed with distilled water and transferred to an agar medium in Petri dishes. The results indicate that formalin, while being a stronger bactericide and fungicide than sulphuric acid, is detrimental to germination, the percentages of which for 10, 15, and 20 minutes' treatments were 60, 50, and 66 for the former and 88, 76 and 70 for the latter, respectively, compared with 71 per cent. germination of the untreated. To obtain satisfactory results after sulphuric acid a further treatment with a mercuric seed dust such as ceresan is recommended. The best results so far obtained (98 per cent. germination compared with 76 per cent. for the untreated) have been a 20-minute steep in 20 l. technical sulphuric acid (66 Baumé) per 100 kg. seed followed by dusting with ceresan (200 gm.). Further checking by field experiments is needed before a reliable conclusion can be reached.

Hall (Laura T.) & Elting (J. P.). **Cavitomic Cotton. A progress report.**—*Text. Res.* (*J.*), 21, pp. 580–590, 10 figs., 6 diags., 11 graphs, 3 maps, 1951. [Received June, 1952.]

This paper amplifies a previous note (*Science*, 113, pp. 297–299, 1951) and covers investigations at the Research Laboratories, Kendal Mills, North Carolina, which demonstrated that cotton of middling grades, good colour, and 1 in. to $1\frac{1}{16}$ in. staple may show measurable and significant alterations of fibre properties (a condition termed 'cavitoma') attributable to micro-organisms or their metabolic products,

the nature of which has not yet been fully established. The deterioration is associated with high pH and low content of reducing materials. In one sample from a mill test of cotton with a loss in strength of approximately 17 per cent. *Actinomyces*, *Penicillium*, and *Aspergillus* were found. In 1950, in addition to *Actinomyces*, *Colletotrichum* [*Glomerella*] *gossypii* [*R.A.M.*, 30, p. 104], *Alternaria*, *Cladosporium*, and a *Fusarium* commonly associated with weathered cotton were detected [cf. ibid., 31, p. 326], as were unidentified bacteria. The organisms may be inside as well as on the outer surface of the fibre. Micro-organisms tentatively identified as *Actinomyces* were isolated from both raw cotton and commercially bleached and finished fabric after surface sterilization by boiling.

Work on the identification and control of the organisms causing cavitoma is in progress.

Boyce (S. W.), Boyce (W. R.), Chamberlain (E. E.), Cumber (R. A.), Fry (P. R.), Matthews (R. E. F.), Newhook (F. J.), & Strzemienski (K.). **Preliminary note on yellow-leaf disease of Phormium.**—*N.Z.J. Sci. Tech.*, Sect. A, 33, 3, pp. 76–77, 1951.

Experiments carried out from 1949 to 1951 virtually established that yellow leaf disease, which threatens the future production of *Phormium tenax* in the North Island of New Zealand [*R.A.M.*, 28, p. 378; 30, p. 362], is caused by a virus transmitted by adults of the endemic leaf hopper *Oliarus atkinsoni*. There was some evidence of seed transmission. The use of dyes and radio-active phosphate indicated that translocation from the roots to the leaves was interrupted by xylem gummosis associated with phloem necrosis in the rhizome vascular bundles. At first these symptoms were detectable only by staining with phloroglucinol and acid but in later stages the vascular tissue was visibly pale yellow to dark red. Their occurrence in leaf and root traces in the rhizome precedes leaf yellowing and wilting, root death, and rhizome rot.

Since the insect is present in its nymphal stage on the roots and leaf bases from March to November this may explain the disease outbreaks which follow drainage and protection of plants from flooding. Controlled flooding therefore promises to provide a valuable control measure in some areas.

This is the first record in New Zealand both of a virus in an indigenous plant and of an endemic insect vector.

Massenot (M.). **Quelques micromycètes maculicoles parasites d'arbustes ornementaux.** [Some spot-forming parasitic microfungi on ornamental shrubs.]—*Rev. Path. vég.*, 30, 4, pp. 205–210, 1 fig., 1951. [Received March, 1952.]

Fungi collected on leaves of *Abutilon striatum* at the National School of Agriculture, Grignon, France, from August to September, 1951, included *Ascochyta abutilonis* [*R.A.M.*, 13, p. 378], *A. abutilonicola* n.sp., causing smaller spots (5 mm.) than the foregoing (1 cm.) and producing pycnidia measuring 100 to 140 μ in diameter with spores 16 to 29 by 5 to 7 μ, and *Leptosphaeria eustoma* [ibid., 29, p. 174], which produced spots indistinguishable from those of *A. abutilonicola* except that they yielded perithecia.

Every year the buds and flowers stalks of peonies at Grignon bear the large brownish lesions of *Botrytis paeoniae* [ibid., 31, p. 491]. At the end of August the leaves of a clump of peonies which appeared chlorotic at a distance were frequently found upon closer inspection to be rolled around the centre vein and bore numerous irregularly shaped, pearly-white to greyish, purple-bordered spots averaging 5 to 6 mm. long and disposed in small groups between the veins. Similar symptoms in Canada were ascribed to *Phyllosticta* sp. [ibid., 3, p. 138]. The pycnidia measured 100 to 170 by 100 to 130 μ and the bi- to pluriguttulate spores 4·5 to 10 by 2 to 4 μ.

A septum was observed in a few of these after three or four days in cotton blue. The fungus is named *A. paeoniae* n.sp.

Murakishi (H. H.). **A mosaic of Vanda Orchids.**—*Phytopathology*, 42, 4, pp. 178–182, 4 figs., 1952.

Much of the information presented in this further study on the mosaic virus affecting *Vanda* orchids in Hawaii has already been noticed [*R.A.M.*, 31, p. 17]. The disease is confined to the genus *Vanda* [ibid., 31, p. 491] and the hybrid *Arachnis hookeriana* × *V. sanderiana*, and could not be transmitted to 31 other species of plants in 27 genera and 15 families. The virus retains its activity in dilutions up to 1 in 10,000 and resists four days' ageing *in vitro*, but is inactivated by five minutes' heating at 60° C. It appears to be distinct from the other orchid viruses.

Uschdraweit (H. A.). **Eine Viruskrankheit bei Treibtulpen.** [A virus disease of forced Tulips.] –Reprinted from *Gartenwelt*, 52, 10, 1 p., 1 fig., 1952.

The 'Augusta' disease of tulips, caused by the tobacco necrosis virus [*R.A.M.*, 29, p. 215], appeared in a few Berlin nurseries in 1952. A list of the most susceptible varieties is given. In Berlin the disease affects forced tulips, but in Holland [loc. cit.] it occurs on the outdoor types.

Servazzi (O.). **Prima segnalazione in Italia della Entyloma dahliae Syd. parassita delle Dalie.** [First report in Italy of *Entyloma dahliae* Syd., a parasite of Dahlias.]—*Mycopathologia*, 6, 2, pp. 99–103, 1 pl., 1951. [English summary.]

In September, 1950, *Entyloma dahliae* [C.M.I. map No. 114; *R.A.M.*, 30, pp. 161, 248], not previously recorded from Italy, was found on *Dahlia juarezi* hort. in a garden at Pollone, in the province of Vercelli, Piedmont. The symptoms [ibid., 12, p. 26] and geographical distribution of the disease are described, and the synonymy [cf. ibid., 27, p. 101] is given. It includes *E. calendulae* f.sp. *dahliae* Sternon (1918) and *E. unamunoi* Ciferri (1925) [cf. ibid., 4, p. 69]. At present the disease appears to be confined to the vicinity of the original outbreak. *D. merckii*, *D. excelsa*, and *D. imperialis* appear to be immune. Control is recommended by the usual methods [ibid., 26, p. 245].

Drayton (F. L.) & Groves (J. W.). **Stromatinia narcissi, a new, sexually dimorphic discomycete.**—*Mycologia*, 44, 1, pp. 119–140, 8 figs., 1952.

At the Division of Botany and Plant Pathology, Ottawa, a study was made of a sclerotial fungus present on the outer bulb scales of narcissus and *Zephyranthes*, hitherto referred to as the large scale-speck fungus, [*R.A.M.*, 11, p. 786] and described herein as *Stromatinia narcissi* n.sp. (syn. *Sclerotinia narcissi* and *Sclerotium ambiguum* var. *narcissi* [cf. ibid., 4, p. 169]). The stipitate, reddish-brown apothecia, produced in four to five months on potato dextrose agar inoculated with sclerotia, measure up to 10 mm. in diameter and 5 to 15 mm. in height, and arise from a stroma usually 0·5 to 1 mm. in diameter. The cylindric-clavate asci, tapering to a long, slender stalk, are 135 to 190 by 7 to 11 μ; the unicellular, ellipsoid to ellipsoid-fusiform, irregularly uni- to biseriate ascospores are 8 to 18 by 3 to 5·5 μ, hyaline at first, becoming pale olive-brown, frequently uniseptate, and 5·5 to 8 μ wide. The hyaline, septate, filiform paraphyses are 1·5 to 2·5 μ in diameter and have rounded tips. The globose, hyaline, uniguttulate spermatia are 1·2 to 2 μ and borne on flask-shaped phialides which may be aggregated in spermodochia. The flattened, black sclerotules are 0·5 to 2 mm. and purely vegetative. Single ascospores gave rise to either silky male or floccose female cultures. The authors discuss heterothallism and describe the fungus as truly heterothallic [cf. below,

p. 617]. Several series of inoculation experiments failed to produce any disease and it is presumed that the fungus is wholly saprophytic.

MacLean (N. A.) & Baker (L. F.). **Downy mildew of Roses.**—*Bull. Roses Inc.* 160, pp. 5–6, 1951.

In 1950–1 rose downy mildew (*Peronospora sparsa*) [*R.A.M.*, 30, p. 370] appeared for the first time in 21 years in the San Leandro and Richmond areas of California. The outbreak appeared to be more destructive than any previously reported, and in infected ranges very few marketable flowers were cut for Christmas. Several large glasshouse ranges were affected and heavy losses were sustained. The autumn and winter of 1950–1 in the San Francisco bay area were exceptionally wet but mild. Many greenhouses were left unheated and therefore remained humid. Sunny weather was lacking, ranges did not dry out, and conditions were highly favourable to infection. Living, detached rose leaves placed in a moist chamber on a north window-ledge in Berkeley were still producing germinable vegetative spores one month after picking. Spores did not germinate at 40° F.; the optimum temperature for germination was 65°, with a slight decrease at 70°, and no germination at 80°. One grower successfully controlled the disease by reducing humidity and raising the temperature to 80° during the warmer part of the day. In glasshouse tests, when the humidity was kept below 85 per cent., the plants remained unaffected and gave vigorous new growth. It is thought that oospores will prove relatively unimportant in the carry-over of the fungus locally if satisfactory cultural conditions are maintained.

The varieties most seriously affected were Red Delight and Pink Delight. Sprays containing 2 lb. zineb (dithane Z-78 or parzate) per 100 gals. water plus an effective spreader-sticker reduced infection in severely affected plantings.

Yurgenson (P. B.). Мичуринское средство против ржавчины Роз. [Michurin's remedy for Rose rust.]—Природа [*Nature, Moscow* = *Priroda, Moskva*], 41, 3, pp. 108–109, 1952.

More than 45 years ago Michurin found that rose rust [*Phragmidium mucronatum*: *R.A.M.*, 17, p. 771] was controlled by rubbing the affected parts with the sap of *Lactuca scariola* [*L. serriola*]. In the present experiment a wild rose bush highly infected with rust was transplanted from the Central Forest Preserve, U.S.S.R., to a garden and the infected parts were rubbed two to three times a day with garlic sap [ibid., 31, p. 157]. The rust disappeared completely after two days.

Brierley (P.). **Exceptional heat tolerance and some other properties of the Chrysanthemum stunt virus.**—*Plant Dis. Reptr*, 36, 6, pp. 243–244, 1952. [Multilithed.]

In tests at Beltsville, Maryland, chrysanthemum stunt virus [*R.A.M.*, 31, p. 120] showed exceptional heat tolerance, not only withstanding boiling but remaining as infectious after this treatment as unboiled samples of the same virus preparation. The virus was still infective in dried leaves after eight weeks, the longest period tested. In two trials preparations similar to those used in the above-mentioned tests were infectious after diluting to 1 in 10,000, but in four other trials much less dilution was tolerated. Leaf extracts stored in open tubes at 18° C. proved infectious after seven weeks but not after eight in four trials. Alcohol preparations were as infective as distilled water ones. It is suggested, therefore, that flaming rather than alcohol should be used for sterilizing tools used in propagating plants.

Srivastaya (H. C.). **Damping-off in Saponaria L.**—*Sci. & Cult.*, 17, 5, pp. 226–227, 1 fig., 1951.

Three fungi were isolated in October, 1949, from damped-off ornamental *Saponaria* seedlings at the Government Agricultural College, Kanpur, India, namely, *Pythium indicum* [*R.A.M.*, 27, p. 572], *P. debaryanum* [ibid., 31, p. 540], and *Rhizoctonia* [*Corticium*] *solani*, all of which proved to be pathogenic in inoculation experiments and were reisolated from the diseased plants. The three species are new records on *Saponaria* for India.

Nikolić (V.). Пламењача на Сунцокрету. [Sunflower blight.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 42–54, 4 pl., 1952. [English summary.]

Sunflower blight (*Plasmopara halstedii*) [*R.A.M.*, 29, p. 56] has been spreading rapidly in Yugoslavia since 1947. In 1951 it was reported from 22 out of the 38 counties in Serbia where sunflower is grown, the disease being particularly severe in Mačva where 50 to 70 per cent. and in some cases even 90 per cent. of the fields were infected. The author's observations on the biology of the fungus and disease symptoms throughout the life-cycle of the plant are described in detail. Mycelium was found in the seeds. To control the spread of the disease a multiple rotation of crops is recommended; seeds for planting should be taken from disease-free regions only; and fields should be carefully examined two to two and a half months after sowing and every infected plant promptly removed and burnt.

Ludbrook (W. V.) & Brockwell (J.). **Control of dollar spot of turf in Canberra, A.C.T.**—*J. Aust. Inst. agric. Sci.*, 18, 1, pp. 39–40, 1952.

Towards the end of 1948, dollar spot (*Sclerotinia homoeocarpa*) [*R.A.M.*, 29, p. 497; 31, p. 341] caused much damage to golf greens in Canberra. In treatments carried out at the Royal Canberra Golf Club, where the greens consist mostly of *Agrostis tenuis* and *Festuca rubra* var. *fallax*, P.A.C.A. (phenyl-amino-cadmium acetate) and C.C. 531 (identical with crag 531) [ibid., 31, p. 331], each applied fortnightly during late spring, summer, and early autumn in 0·1 per cent. aqueous solution at the rate of 50 gals. per 600 sq. yds., and a mixture of 1·5 oz. each of mercurous and mercuric chlorides in 50 gals. water, applied monthly during the same period at the rate of 50 gals. per 1,000 sq. ft., were used. The respective disease ratings (0 indicating complete control with recovery of the turf and 5 spread such that all the turf in the plot was infected) obtained were 0·4, 0·7, and 0·7, as against 3·2 for the untreated turf. The mercury mixture retarded growth of turf. P.A.C.A. has since been used as a routine turf treatment whenever environmental conditions appeared to favour infection; effective control has resulted, with no adverse effect on quality and vigour of the turf.

Vasudeva (R. S.), Jain (A. C.), & Nema (K. G.). **Investigations of the inhibitory action of Bacillus subtilis on Fusarium udum Butl., the fungus causing wilt of Pigeon-pea (Cajanus cajan (L.) Millsp.).**—*Ann. appl. Biol.*, 39, 2, pp. 229–238, 1952.

Further studies are reported from the Division of Mycology and Plant Pathology, Indian Agricultural Research Institute, New Delhi, on the inhibition of the pigeon pea wilt organism, *Fusarium udum*, by *Bacillus subtilis* [*R.A.M.*, 31, p. 540]. In a dextrose-asparagine-phosphate medium the inhibitory substance produced by the bacterium was most active between 24° and 34° C. for up to 12 days' incubation and at pH 6·5 to 8·5. The active principle was adsorbed by soil and to a lesser degree by kaolin. The organic matter and soluble salts present did not appear to play an important part in the loss of activity of the filtrates during passage through a bed of soil.

Boawn (L. C.) & Viets (F. G.). **Zinc deficiency of Alfalfa in Washington.**—*Agron. J.*, 44, 5, p. 276, 1 fig., 1952.

A stand of Ranger lucerne planted in the spring of 1951 on virgin, very fine sandy loam at the Irrigation Experiment Station, Prosser, Washington, developed typical symptoms of zinc deficiency [cf. *R.A.M.*, 31, p. 141]. On 8th August, when the affected plants were about 4 in. high as compared with the normal 12 to 14, a small plot in the centre of the stand was sprayed with 0·5 per cent. zinc sulphate. After about ten days a clear-cut response was noticeable in the form of accelerated growth and normal coloration. On the 14th the same plot was sprayed again with zinc sulphate and two other plots were treated with 0·5 per cent. zinc chloride, which also promoted a very definite increase in growth. Shoots taken at the early bloom stage from stunted and healthy plants contained 8 and 13·8 p.p.m. zinc, respectively.

Report of the Director of Food Investigation for 1950.—*Rep. Fd Invest. Bd, Lond., 1950*, pp. 9–35, 1952.

On p. 31 of this report it is stated that investigations on the incidence of scald [*R.A.M.*, 30, p. 571; 31, p. 333] and on the production of ethylene and other volatile compounds by apples held in gas storage have been continued, but the relation between volatiles and scald remains obscure. New techniques such as the use of charcoal filters [ibid., 30, p. 508] and ozone for eliminating volatiles from the atmosphere are being studied but rapid progress is not expected.

Pre-storage treatment with oil-water emulsions containing phenyl mercuric chloride [ibid., 29, p. 103] at concentrations as low as 0·025 per cent. again reduced [unspecified] fungal rotting in apples. Emulsions containing the same amount of ethyl mercury thiosalicylate reduced rotting to about the same extent but tainted the fruit slightly.

A method for estimating mercury residues on treated fruit demonstrated that the skin of fruit treated with a coating containing initially 0·035 per cent. phenyl mercuric chloride and kept at 40° F. contains only 2 to 3 p.p.m. mercury at the end of the storage season (February). At room temperatures mercury disappears in a few weeks from the skin of fruit treated with low concentrations of the fungicide and does not enter the flesh.

Preliminary results of a systematic study on the effect of various fungicides on the reduction of apple rots indicate that a treatment which reduces *Sclerotinia fructigena* [loc. cit.] does not necessarily control *Penicillium expansum* [ibid., 31, p. 243] or other fungi. Many fungicides increase rotting by damaging the fruit skin.

Turnbull (J.). **Apple scab spraying competitions in Kent.**—*J. Minist. Agric.*, 58, 12, pp. 588–592, 1952.

The results obtained in two spraying competitions in Kent against apple scab [*Venturia inaequalis*: cf. *R.A.M.*, 31, pp. 290, 334, and next abstract], arranged by the Cranbrook and Paddock Wood branches of the National Farmers' Union for commercial growers in 1951, are reviewed and discussed. There were 28 competitors and over 1,000 acres of orchard land were covered. The season was exceptionally wet. Most cases of scab occurred where, owing to poor circulation of air, moisture did not dry off quickly enough. Other factors adversely affecting control, though to a much smaller extent, were an excessive use of nitrogen, and the size and variety of the trees. Severe infection occurred only on Bramley and Laxton; most of the former were very large trees and many were closely planted in sheltered positions.

Lime-sulphur, colloidal and dispersible sulphurs, and copper-lime dust were

commonly used, and various mercury preparations were also applied at post-blossom. All gave control in some localities but failed in others. Nothing was gained by applications made at more than the recommended strengths, even under unfavourable conditions. Mercurial preparations gave good results when applied to Bramleys at post-blossom, but proved too risky for general use on Cox's Orange. The best result for Cox was obtained with two early applications of colloidal sulphur followed by seven sprays of dispersible sulphur. With Bramleys the most effective treatment was one application of 4 per cent. lime-sulphur, three of 2 per cent., and one at 1 per cent. during blossoming, followed by three applications of a mercurial preparation. Many of the trees so treated were in a valley, and the sprays were applied by air blast, only half the usual amount of dilute wash being used. The results as a whole indicated that the longer the intervals between applications and the fewer the treatments in April and May, the less satisfactory is the control obtained. Over one-third of the entries were free, commercially speaking, from diseases and pests, and another third were not far below this grade.

Growers should use a ladder to inspect the tops of trees. Every farm should be equipped to complete one spraying of all the apple trees in three days, and until it is so equipped dust should be used between the sprays. Sulphur dust was effective and was uninjurious to Cox's Orange unless applied very heavily.

Burnet (I. M.). **Controlling scab on Apples. Some trials with the new foliage fungicides.**—*Fruit Gr., 1952*, 2961, pp. 553–554, 1952.

Results are given of the 1951 trials at Fernhurst Research Station, [Surrey], under orchard conditions, in which five fungicides were compared with standard lime- and dispersible sulphur sprays for their effectiveness against apple scab [*Venturia inaequalis*: see preceding abstract]. All the preparations proved at least equivalent to sulphur in efficiency, some being more economical and safer to use. With ferbam (0·2 per cent.) [*R.A.M.*, 31, p. 341], glyoxalidine (0·4 per cent.) [ibid., 31, p. 290], and dichloronaphthoquinone (0·06 per cent.) [ibid., 30, p. 362] average leaf infections for the varieties Cox, Ellison, Blenheim, Superb, and Fortune were 3, 5, and 2 per cent. for the three fungicides, respectively, and 5, 4, and 4 per cent. on the fruit, compared with 6 and 15 (leaves) and 12 and 22 per cent. (fruit) for lime-sulphur (spersul) and the unsprayed controls, respectively. There was no phytocidal effect and the foliage throughout the season appeared considerably better than after the standard treatment. Thiram [ibid., 31, p. 341] too, which is less economical, as more frequent applications are required, caused no phytocidal effect even on Cox. On the contrary, it imparts a splendid 'finish' to the fruit and might be considered for the final applications. Mercurials, however, are recommended as being the most advantageous substitute for sulphur. They are both protective and curative. In a larger trial they were compared with lime-sulphur in two pre- and four post-blossom sprays, the first on 27th April and the last on 20th July, and included a phenyl mercuriacetate [ibid., 28, pp. 85, 101], two based on phenyl mercurichloride [ibid., 31, pp. 341, 362], and two on phenyl mercury compounds (one liquid) [cf. ibid., 27, p. 481]. Under the 1951 conditions, characterized by a heavy, late attack of scab, the results were on the whole very good, though owing to a late start no scab-free fruit was obtained. As a result of these and further trials a product containing 2·5 per cent. mercury as phenyl mercury acetate has been developed and is recommended for use at 0·125 per cent. Tests showed that though mercury damage was on the whole bad in 1951, the new preparation caused serious damage only on Cox; Bramley and Worcester appeared to be the most resistant. Special care is required when mercury is used for high volume applications or in combination with other sprays. To avoid scorch, moreover, all the spray of one application should be applied at once, and not in two portions.

Stojanović (D.). Прилог испитивању могућности сузбијања краставости Јабука. [Investigation into the possibility of controlling Apple scab.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 35–41, 2 pl., 3 graphs, 1952. [English summary.]

In experiments at the Institute of Agricultural Research, Kragujevac, Yugoslavia, in 1951 one spray of 1 per cent. Bordeaux mixture or of 1:40 lime-sulphur applied in time, i.e., according to the development of the perithecia and the discharge of ascospores, gave perfect protection to the leaves against apple scab (*Venturia inaequalis*) [see above, p. 594] despite the very high disease incidence that year.

Gaudineau (M[arguerite]). **L'oïdium du Pommier. Persistance et essais de lutte.** [Apple mildew. Persistence and control experiments.]—*C. R. Congr. pomol. Metz*, 82, pp. 69–73, 1951. [Received April, 1952.]

Details are given of the symptoms, economic importance, dissemination, overwintering, and control of apple mildew (*Podosphaera leucotricha*) [*R.A.M.*, 31, p. 243] in the south west of France [ibid., 29, p. 104]. In 1951 symptoms were observed for the first time on flowers of Museau de Lièvre and three-year-old Cox's Orange Pippin trees in the same orchard, owing to conditions which favoured secondary infection.

Atkinson (J. D.) & Robbins (R. E.). **Green-crinkle, a virus disease of Apples.**—*N.Z. J. Sci. Tech.*, Sect. A, 33, 3, pp. 58–61, 3 figs., 1951.

Green crinkle, an apple disease probably caused by the same virus as false sting [*R.A.M.*, 30, p. 167], occurs in all the main fruit districts of New Zealand. Symptoms are confined to the fruit and often only a single branch is affected. Although not a major disease it has caused appreciable losses in certain varieties, particularly Granny Smith. It can be transmitted from infected trees to healthy scions and from diseased buds to healthy trees.

Poulos (P. L.) & Heuberger (J. W.). **Relation of wounds to the fruit rot phase of the brown rot diseases of Peaches.**—*Plant Dis. Reptr*, 36, 5, pp. 198–200, 1952. [Multilithed.]

Counts made on Triogem peaches affected by brown rot (*Monilinia* [*Sclerotinia*] *fructicola*) [*R.A.M.*, 31, pp. 72, 389] at Bridgeville, Delaware, showed that 90·9 and 97·3 per cent. of the fruit in 1950 and 1951, respectively, had a wound in the centre of the rotted area. In the 1951 spray trial at Wyoming on the Elberta variety the standard peach fungicide schedule used in Delaware (*Bull. Del. agric. Ext. Serv.* 54, 1951) was applied in combination with the standard insecticide schedule and gave better control of brown rot (6·8 and 8·2 per cent. fruit infection with and without blossom sprays, respectively) than the fungicide schedule alone (16·8 and 14·1 per cent.). The last spray application was made on 2nd August since the authors showed earlier that pre-harvest sprays were not effective on late-maturing varieties, such as Elberta, in Delaware (Abs. in *Phytopathology*, 39, p. 18, 1949, and *Trans. Peninsula hort. Soc.*, 39, pp. 82–84, 1949). Blossom sprays reduced blossom blight to less than 1 per cent. compared with 10 per cent. where they were omitted.

Angell (H. R.). **Brown rot of stone fruits. 1. An unsuccessful attempt to increase percentage infection by artificial inoculation.**—*J. Aust. Inst. agric. Sci.*, 17, 4, pp. 212–213, 1952.

In a further attempt to increase the percentage of brown rot (*Sclerotinia fructicola*) developing on a branch of an apricot tree at Canberra [*R.A.M.*, 30, p. 47]

the fruit was sprayed in October and November, 1950, with a conidial suspension. The results indicated that a heavy spore load is not the cause of severe infection, the percentage of brown rot being lower on the sprayed than on the unsprayed branches. The percentage of brown rot on the tree in December, 1950, when rainfall was low, was 18, as against under 1 in December 1947, when wet weather prevailed.

In *J. Aust. Inst. agric. Sci.*, 18, 1, p. 56, 1952, is a letter from G. C. Wade stating that experiments conducted by him during the past three years at the Department of Agriculture, Hobart, have demonstrated that apricots do not become susceptible to air-borne infection by brown rot until ripening has begun [cf. *R.A.M.*, 31, p. 335]. Inoculations conducted as early as October and November when the fruit is green could not, therefore, be expected to have any affect on the degree of infection.

In his reply in the same number H. R. Angell points out that in some apricot orchards at Canberra severe loss from brown rot has been experienced six weeks or more before the expected time of ripening, and in some seasons in Victoria the disease may occur on green fruit.

Stanković (D.). Производња здравог садног материала као мера борбе противу вироза у воћарству. [Production of healthy planting material as a control measure against virus diseases in fruit-growing.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 93–98, 1952.

Plum pox disease [peach mosaic virus: *R.A.M.*, 27, p. 27] is reported to be very serious on plums in Yugoslavia, particularly on the Požegača variety, and its rapid spread threatens the whole plum-growing industry. Virus diseases [unspecified] on apricots, cherries, peaches [ibid., 31, p. 335], and figs [see below, p. 616] are causing a serious problem also and the author suggests strict preventive measures to be taken immediately. These include the prevention by law of the introduction of diseased material into uninfected regions and the burning of such material, lime-washing the trees, and destruction of aphid vectors, and depend on the ability of fruit growers to detect the diseases in their earliest stages, and to assist in their localization. A control commission is suggested for the regular inspection of trees.

Zobrist (L.) & Hoffmann (E.). **Der Zwetschgenrost und seine Bekämpfung.** [Damson rust and its control.]—*Schweiz. Z. Obst- u. Weinb.*, 61, 9, pp. 169–173, 2 figs., 1952.

Spraying experiments for the control of *Tranzschelia* [*Puccinia*] *pruni-spinosae*, the aecidial stage of which occurs on *Anemone ranunculoides*, *A. hepatica*, *A. coronaria*, and *Eranthis hiemalis* in Switzerland, [*R.A.M.*, 31, p. 223], were carried out in the grounds of the Chemische Fabrik Dr. R. Maag AG, Dielsdorf, on 64 trees, divided into eight groups, each containing three of Ersinger, one of Prinz Engelbert, and two each of Early Laxton and Fellenberg. The treatments, applied on 21st April, 9th and 29th May, and 18th June, were designed to compare the effects on the rust of the thiocarbamate M555 [ibid., 31, p. 67] with those of standard fungicides, represented by wettable sulphur (sofril), lime-sulphur plus a wetter (etaldyn) [ibid., 23, p. 91], and lime-sulphur plus iron sulphate.

Four applications of M555 at 0·2 per cent. conferred absolute protection from the rust, three being considerably less effective. The other compounds tested were inadequate. A third post-blossom spray with copper-containing mixtures was definitely harmful, especially to Ersinger. It should, however, be practicable to replace M555 by the cheaper sulphur or lime-sulphur sprays for the first post-blossom treatment, when the foliage is still relatively sparse, and possibly even for the second, but further experiments are necessary to elucidate this point.

Jensen (D. D.), Frazier (N. W.), & Thomas (H. E.). **Insect transmission of yellow leaf roll virus of Peach.**—*J. econ. Ent.*, 45, 2, pp. 335–337, 1952.

Yellow leaf roll virus of peach, a serious disease in northern California [*R.A.M.*, 30, p. 375], was transmitted by the widespread geminate leafhopper, *Colladonus geminatus* [ibid., 31, p. 22], in 31 greenhouse tests at the University of California, Berkeley, in 1950–1. The latent period of the virus in its vector typically exceeds a month. Thereafter the leafhopper may retain the infective principle for extended periods and infect several trees in succession.

Monin (A.). **Description et identification des variétés de Cerisiers.** [The description and identification of Cherry varieties.]—*Bull. Inst. agron. Gembloux*, 19, 3–4, pp. 276–326, 35 diags., 1951. [Received June, 1952.]

In a recent survey the following sweet cherry varieties in Belgium were highly resistant to [unspecified] rotting and unaffected by transportation: Lamotte, Early Rivers, Puntkers, Lieveling, Pater van Mansfeld, Abbesse de Mouland, Bigarreau C 47, Bigarreau Napoléon, Wimmertingse, Schneiders Knorpelkirsche, Zwarte Bigarreau van Ordingen, Udensche Spaansche, and Late Kraker.

Mackay (J. H. E.). **Acti-dione treatment of Cherry fruit.**—*J. Aust. Inst. agric. Sci.*, 17, 4, pp. 216–217, 1952.

At the Division of Plant Industry, Canberra, clean-skinned, firm, ripe Kentish cherry fruits were dipped for one minute in solutions of 1, 5, 10, and 25 p.p.m. actidione in distilled water, drained, and stored. Groups of fruit on a commercial dark cherry tree were sprayed once with the 1 and 25 p.p.m. solutions. In both experiments the treatment had no phytotoxic effects and did not affect the keeping quality or flavour of the fruits [cf. *R.A.M.*, 29, p. 417].

Cadman (C. H.). **Studies in Rubus virus diseases. II. Three types of vein chlorosis of Raspberries.**—*Ann. appl. Biol.*, 39, 1, pp. 61–68, 2 pl., 1952.

These further studies at University College, Dundee, on *Rubus* virus diseases [cf. *R.A.M.*, 31, p. 439 and next abstract] comprise descriptions of three group I diseases [ibid., 31, p. 192] common in commercial raspberry stocks and termed mild, moderate, and severe vein chlorosis. On Norfolk Giant mild vein chlorosis is characterized by faint yellowing of the tissue bordering the smaller leaf veins, occasionally coalescing into small diffuse patches. Symptoms are often localized and generally difficult to detect. Those of moderate vein chlorosis on the same host are similar but more generally distributed and much more conspicuous. They are not modified by the presence of group II viruses but other group I viruses cause reduction in vigour. In neither the mild or the moderate type are the symptoms masked in warm weather. The severe form, first found on Norfolk Giant in Eastern Scotland in 1944, is typified by intense chlorosis of the smaller leaf veins and adjacent tissue, regularly coalescing into large and conspicuous patches. Severely affected leaflets are frequently distorted and curled.

The mild form has not been detected on commercial stocks of Norfolk Giant in Scotland but developed on plants of this variety grafted to 'healthy' plants of Baumforth's Seedling B in 1948 and 1949. All 'healthy' plants of the latter variety handled since 1944 also showed symptoms. There is some evidence that this chlorosis may be transmitted by *Doralis* [*Aphis*] *idaei*.

Moderate vein chlorosis commonly occurs in commercial stocks of Norfolk Giant and other varieties; it was shown to be graft-transmissible in 1944, and is also transmissible to and produces symptoms of the moderate type in Lloyd George, St. Walfried, Burnetholm Seedling, and the Malling varieties Enterprise, Jewel, Notable, Promise, Exploit, and Seedlings M and Z. Baumforth B, however,

developed only mild chlorosis when grafted to Landmark infected with the moderate form, but developed curly dwarf when grafted to Lloyd George and Norfolk Giant with moderate symptoms. They all produced moderate vein chlorosis symptoms on healthy Norfolk Giant indicators to which they were grafted.

In 1945 severe chlorosis was transmitted to healthy plants of Norfolk Giant by grafting. Ten plants of Lloyd George (New Zealand stock) grafted with infected Norfolk Giant scions in 1947 and 1948 developed severe chlorosis a year later. Similar but more severe symptoms developed after grafting with infected Norfolk Giant on eight plants of a commercial stock of Lloyd George known to be infected with other viruses. Norfolk Giant infectors grafted to other plants produced marked vein chlorosis and cane dwarfing on Notable, Promise, and Seedling M. Symptoms on Promise were characteristically restricted to the leaf margins and the leaves were down-curled. Four plants of Malling Landmark grafted in 1947 and 1948 developed severe chlorotic blotching and vein chlorosis and the young canes were severely stunted. Despite repeated attempts severe vein chlorosis was not transmitted to Baumforth's Seedling B nor the North American varieties Newburgh and Cuthbert.

CADMAN (C. H.). **Studies in Rubus virus diseases. III. A veinbanding disease of Raspberries.**—*Ann. appl. Biol.*, 39, 1, pp. 69–77, 1 pl., 1952.

A chlorotic veinbanding disease found on Norfolk Giant raspberries in eastern Scotland in 1944 [*R.A.M.*, 29, p. 315; 31, p. 192] proved identical with mosaic 1 described by Harris [ibid., 19, p. 293] in graft-transmissibility and symptom expression on Baumforth's Seedling B and Lloyd George. The virus was transmitted by the aphid *Amphorophora rubi* after feeding periods of 18 hrs or more. It causes leaf symptoms, masked in hot weather, on a wide range of European and North American varieties; on the latter they are analogous to those of the red raspberry mosaic [raspberry mosaic virus] described by American authors [ibid., 30, p. 15].

The names veinbanding disease and raspberry veinbanding virus are proposed.

HUBER (G. A.) & JOHNSON (F.). **Black Raspberry mosaic in western Washington.** —*Plant Dis. Reptr*, 36, 6, pp. 239–240, 2 figs., 1952. [Multilithed.]

The symptoms of black raspberry mosaic [*R.A.M.*, 29, p. 516; cf. 31, p. 439] in western Washington are described. In black raspberries they are of two types: cane-tip dieback and leaf mottle. The former appears first as small water-soaked areas that later become purple or as streaks on the young petioles or cane tips which bend, become brittle, and often die. The mottle appears on young leaves as chlorotic areas intermingled with the normal green, irrespective of the veins, sometimes occurring in an irregular ring spot pattern. During the high summer temperatures cane tip distortion may not appear but growth is checked; the mosaic symptoms also disappear but reappear later. Either symptom may appear on its own but eventually both occur in the affected plant; growth is greatly retarded, and the fruiting laterals dwarfed. In red varieties, hitherto considered to be unaffected, the symptoms are indistinct and not detrimental to the plant, occurring usually on the leaves during the low temperatures of spring and autumn and being masked in the hot weather. The small, irregular, pale green areas or flecks, most pronounced on the lower foliage, appear in some varieties as indistinct rings. Characteristic disease symptoms were obtained by grafting tissue from affected red to healthy black varieties, and also by aphids (*Amphorophora rubi*) transferred from black to red and red to black under controlled conditions. The virus was recovered from the wild black raspberry (*Rubus leucodermis*).

Brichet (J.). **'L'œil du paon' (Cycloconium), maladie grave du feuillage de l'Olivier.** ['Peacock's eye' (*Cycloconium*), a serious foliage disease of the Olive tree.]—*Fruits Prim. Afr. N.*, 22, 232, pp. 10–11, 1952.

The author reviews the history, symptoms, biology, and control of olive leaf spot caused by *Cycloconium oleaginum* [C.M.I. map No. 183; *R.A.M.*, 28, p. 466], which has become increasingly prevalent in North Africa [ibid., 29, p. 572] in recent years. Control lies not in attempting to spray the existing badly kept plantations, but in establishing ordered plantings of known varieties, which are easily accessible to spraying equipment and maintained under hygienic conditions.

Perišić (M.). **Mosaik Smokve.** [Fig mosaic.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 62–63, 2 pl., 1952. [French summary.]

In 1947 fig mosaic virus [*R.A.M.*, 29, p. 267, and above, p. 613] was detected in the vicinity of Dubrovnik, Yugoslavia, on young fig trees which had originally been grown at Split. The disease was also observed at Djevdjelija, Macedonia, in 1951. There appears to be no previous record of this disease in Yugoslavia.

Rieuf (P.). **La rouille du Pistachier au Maroc.** [Rust of Pistachio in Morocco.]—*Fruits d'outre mer*, 7, 2, pp. 70–71, 6 figs., 1952.

In September, 1951, seedlings of *Pistacia vera* sent to Morocco from the United States were attacked by rust (*Pileolaria terebinthi*) [cf. *R.A.M.*, 29, p. 383; 31, p. 147]. Among the defoliated plants two with small, narrow, pointed leaflets remained completely unaffected.

Brun (J.) & Py (C.). **Symptômes foliaires de carence en zinc sur l'Ananas en Guinée Française.** [Foliar symptoms of zinc deficiency on Pineapple in French Guinea.]—*Fruits d'outre mer*, 7, 2, pp. 62–64, 4 figs., 1952.

In French Guinea fully developed leaves of pineapple plants affected by zinc deficiency [cf. *R.A.M.*, 22, p. 143] bear round or elongated yellowish spots over the entire upper surface. In length they may exceed 1 cm. and a brown dot appears in the centre. The lesions may then coalesce into large yellow areas, the upper epidermis frequently swelling. Finally, the central brown dot spreads and the leaf tissue is completely destroyed; the centre of the dead area is depressed, pale brown, papyraceous, and wrinkled, and has a dark brown raised rim surrounded in turn by a yellowish area. In the first stage the spots are best seen by transmitted light.

The most susceptible varieties are those with conical fruit and a pale flesh rich in sugar, such as Abacaxi and Sugar Loaf. Cayenne and Baronne de Rothschild are more resistant, particularly the former, while the Queen group (including Comte de Paris and Natal) appears to be even less affected. The local varieties, including Soussou and Montserrat, are also affected.

Treatment consists in spraying with 1·5 per cent. zinc sulphate neutralized with 75 gm. of lime at the beginning and end of the dry season, using about 50 ml. per plant. Distinct improvement follows in three weeks, the new leaves showing no symptoms. Alternatively, 25 kg. zinc sulphate can be incorporated in each ton of fertilizer.

Guzmán (V. L.). **El problema de los Paltos en Chanchamayo.** [The Avocado problem in Chanchamayo.]—*Inf. Estac. agríc. La Molina* 73, 9 pp., 4 figs., 1951. [Mimeoprinted.]

On the basis of experiments to determine the practicability of combating the root rot of avocado caused by *Phytophthora cinnamomi* in the Valley of Chanchamayo, Peru [*R.A.M.*, 31, p. 192], by cultural methods, the author recommends

5 to 10 kg. guano and 10 kg. double carbonate of calcium and magnesium per tree [loc. cit.].

Moberg (H. A.). **Moderna växtskyddsredskap och deras användingsmöjligheter i de nordiska länderna. Moderna växtskyddsmaskiner.** [Modern plant protection equipment and the possibilities for its application in the Scandinavian countries. Modern plant protection machines.]—*Nord. JorbrForskn.*, *1951*, 2–3, pp. 514–518, 1951.

This is a discussion, presented at the eighth congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950, on up-to-date developments in apparatus for the protection of crops by spraying and dusting and their potential application in Scandinavia [cf. *R.A.M.*, 31, p. 502].

Moore (M. H.). **Some thought on progress in fruit-spraying methods.**—*J. Pk Adm.*, 17, 4, pp. 159, 161, 163, 165, 1952.

The author traces the development of spraying apparatus for fruit trees from its inception in 1916 up to the present day with particular reference to methods now obtaining in Great Britain [*R.A.M.*, 30, pp. 235, 236; 31, pp. 133, 290].

Potter (C.). **An improved laboratory apparatus for applying direct sprays and surface films, with data on the electrostatic charge on atomized spray fluids.**—*Ann. appl. Biol.*, 39, 1, pp. 1–28, 1 pl., 5 diags., 1952.

Details are given of the design and physical performance of a laboratory spraying apparatus developed at the University of Rhode Island, Kingston, Rhode Island, and the Department of Insecticides and Fungicides, Rothamsted Experimental Station, Harpenden, Herts., as an improved version of one originally described in 1941 (*Ann. appl. Biol.*, 28, p. 142, 1941). While the principle remains the same there are several constructional modifications. The apparatus consists of a reservoir and a specially designed atomizing nozzle which sprays down the centre of a metal tube on to a circular spray table. Both the direction of the spray and the gap between the spray table and the bottom of the tube or spray tower can be adjusted. It can be employed to apply even residual films on a wide variety of surfaces of adequate area and may be used with media varying from distilled water to heavy oil.

Moreau (C.). **Les maladies parasitaires des principales cultures coloniales. Revue bibliographique. VIII.** [The parasitic diseases of the principal colonial crops. Bibliographical review. VIII.]—*Rev. Mycol.*, 16, *Suppl. colon.* 2, pp. 124–138, 1951. [Received April, 1952.]

Further notes are given on the principal diseases of colonial crops [cf. *R.A.M.*, 31, p. 250] based on the literature (82 titles) published from 1947 to 1951.

Korf (R. P.). **The terms homothallism and heterothallism.**—*Nature, Lond.*, 170, 4326, pp. 534–535, 1952.

The author discusses the interpretation placed by Drayton and Groves on the terms homo- and heterothallism [see above, p. 607; cf. *R.A.M.*, 31, p. 72]. He considers that they have perpetrated an error of logic. The terms were coined to denote a physiological and not a morphological phenomenon in fungi. A homothallic fungus differs from a heterothallic one in that the life-cycle can be completed starting from a single haploid nucleus, while in the latter a union of two physiologically different, haploid nuclei is essential. 'Haploid nucleus' is only a more precise term for 'single spore' previously applied by Blakeslee. The author further

suggests that the terms morphological and physiological heterothallism [ibid., 29, p. 224] are unnecessary and that dioecious or monoecious express better the morphological concept.

GREGORY (P. H.). **Spore content of the atmosphere near the ground.**—*Nature, Lond.*, 170, 4325, pp. 475–477, 1952.

An apparatus drawing in a known volume of air without altering its spore content, removing all particles over the 2 to 100 μ size range, and leaving them in a form in which they can be examined, counted, and classified is essential for efficient sampling of the air spora [see next abstracts]. The slit-sampler (*J. Hyg., Camb.*, 41, p. 197, 1941) is well adapted for volumetric sampling of still air but is less suitable for air in motion out of doors.

At Rothamsted Experiment Station, Harpenden, Herts., in 1952, the cascade impactor (*J. sci. Instr.*, 22, p. 187, 1945), designed for sampling aerosols in the field, was used in dry weather for volumetric sampling of the outdoor air spora in several series of six consecutive four-hour runs at a height of 2 m. A fin directs its orifice into the wind and air is drawn through it on to a sticky slide behind for impacting the large particles. The air is then accelerated by being drawn through three successively smaller jets, each impacting on a separate slide. The catch is thus fractioned into four size-groups. For collecting all spores in the sampled air, the air-intake speed through the first jet should be adjusted to the speed of the wind. Use of the cascade impactor revealed an air spora quite different from that obtained on surface traps [cf. *R.A.M.*, 31, p. 251] and disclosed a much higher proportion of smaller spores. Uredospores of *Puccinia* spp. [ibid., 31, p. 134] were not abundant despite heavy wheat infection with *P. glumarum* [ibid., 31, p. 540] within 600 yds. of the trap, while conidia of *Erysiphe graminis* [ibid., 31, p. 170], much higher concentrations of which occurred later in the season, probably came from a heavily infected spring-sown barley field 50 yds. away. Spores of *Ustilago avenae* and probably of *U. perennans*, occurring singly or in clumps, formed a substantial proportion of the total. Basidiospores of *Ganoderma* occurred. Minute, hyaline spores, many believed to be of *Sporobolomyces* spp., reached the high concentration of 7,000 per cu. m. in the early morning but disappeared soon after dawn as the daytime spora became re-established. Another group, the composition of which is still obscure, consisted of minute, hyaline, rod-shaped, jointed or septate spores.

HIRST (J. M.). **An automatic volumetric spore trap.**—*Ann. appl. Biol.*, 39, 2, pp. 257–265, 1 pl., 1 diag., 1 graph, 1952.

A description is given of the construction of an automatic, volumetric apparatus consisting of an impactor unit, wind-vane housing, and motor housing, which was developed at Rothamsted Experimental Station, for trapping air-borne spores [see preceding and next abstracts]. A vaselined microscope slide is moved by means of a clock mechanism at 2 mm. per hour past an orifice, 14 by 2 mm., to which suction at the rate of 10 l. per min. is applied. A continuous trace of the day's spores is thus deposited on an area 48 by 14 mm. The wind-vane directs the orifice towards the wind. The orifice should be as short as possible and of the same bore throughout to avoid spore deposition on the walls. The mechanism for moving the slide should be as small as possible to avoid disturbance of air at the orifice which projects 10 mm. from it. For convenience the orifice was placed at a height of 2 m. from the ground.

Wind tunnel tests with spores of *Lycoperdon clavatum* [*R.A.M.*, 31, p. 251] showed maximum and minimum efficiencies of 93·8 and 62·4 per cent., respectively, at wind velocities ranging from 1·5 to 9·3 m. per sec.

Gregory (P. H.) & Hirst (J. M.). **Possible role of basidiospores as air-borne allergens.**—*Nature, Lond.*, 170, 4323, p. 414, 1 graph, 1952.

In studies at Rothamsted Experimental Station, the air 2 m. above a potato plot was sampled continuously from 1st June to 30th September, 1951, using the automatic volumetric spore trap already described [see preceding abstract]. The number of hyaline basidiospores fluctuated rapidly, transient clouds being observed at various times. For example four or five hours after rain had fallen on 22nd July, following eight rainless days with a high concentration of *Cladosporium* and *Ustilago*, a high proportion of minute hyaline basidiospores occurred, reaching a maximum of about 30,000 per m. at about 2 a.m. on the 23rd and disappearing almost entirely as the *Cladosporium* cloud [*R.A.M.*, 29, p. 40] become re-established.

The numbers of coloured basidiospores, mainly from Agaricaceae, were remarkably uniform; in late summer the daily mean concentration seldom fell below 1,000 per m. of air. On dry days it was lowest in the afternoon, increasing by three to five times in the early hours of the morning. This is in almost direct contrast to other spore types [ibid., 31, p. 251] which occur in minimum concentrations at night.

The seasonal flush of agarics and polypores requires investigation in connexion with seasonal asthma.

Archer (W. A.). **Aerosol for controlling herbarium pests.**—*Science*, 116, 3009, pp. 233–234, 1952.

The author recommends the use of an aerosol bomb [cf. *R.A.M.*, 27, p. 288] containing 40 gm. pyrethrum extract, 60 gm. cyclohexanone, 100 gm. DDT, and 1,800 gm. freon, for the disinfection of herbarium specimens against cockroaches and beetles. The treatment is given every six months.

Venkatram (C. S.). **A photographic method for determining apical growth in fungal hyphae.**—*Proc. Indian Acad. Sci.*, Sect. B, 34, 5, pp. 256–257, 1 pl., 1952.

The following technique for measuring the growth rate of fungal hyphae in Petri dishes ('K' type) was used at the University Botany Laboratory, Madras. Clear potato dextrose agar and a fast-growing strain of *Rhizopus nodosus* isolated from cotton seed [*R.A.M.*, 30, p. 519] were employed, growth measurements being taken six hours after inoculation using a Zeiss ×10 objective [eyepiece] and screw-type adjustable eyepiece micrometer. A single hypha was then brought into the field with the tip flush with the 0 on the scale. Photomicrographs were taken with a Zeiss Miflex camera attachment, illumination being manipulated to give a good picture with a one second exposure on Ilford H.P. 3 plates. Although branches developed freely their position on the scale remained unchanged, thus confirming that hyphal growth was entirely apical [cf. ibid., 2, p. 588].

Timnick (Margaret B.), Barnett (H. L.), & Lilly (V. G.). **The effect of method of inoculation of media on sporulation of Melanconium fuligineum.**—*Mycologia*, 44, 1, pp. 141–149, 7 figs., 1952.

In further studies on *Melanconium fuligineum* (*Mycologia*, 43, pp. 625–634, 1951) at West Virginia University, Morgantown, agar plate cultures inoculated at one point with mycelium or a few spores required 11 to 14 days for sporulation, the maximum production (approximately 1,200,000,000 spores per culture) occurring after about 20 days. When the plates were flooded with a concentrated spore suspension sporulation began within 24 hours, maximum production, about twice as great as the foregoing, occurring within four days, the first spores being produced on the germ tubes and very young mycelium.

A hypothesis, based on the rapid depletion of nutrients by the multiplicity of growing points, is presented to explain the rapid production of spores by the second method of inoculation.

Thom (C.). **Molds, mutants and monographers.**—*Mycologia*, 44, 1, pp. 61–85, 1 pl., 1952.

This lecture, in a semi-popular vein, is concerned with the mycological responsibilities of industrial mycologists. The author discusses various problems encountered in industry by the worker with moulds, including the importance of type cultures, culturing procedure, substrata, growth optima, taxonomy, variation, and mutation, and urges workers who have specialized in a particular field for any length of time to publish a monograph on their subject at least once, or every ten years if possible.

Leben (C.), Stessel (G. J.), & Keitt (G. W.). **Helixin, an antibiotic active against certain fungi and bacteria.**—*Mycologia*, 44, 2, pp. 159–169, 1 fig., 1952.

The name helixin [see next abstract] is tentatively proposed for the antibiotic substance recently produced at the Wisconsin Agricultural Experiment station [*R.A.M.*, 30, p. 577]. It completely inhibited macroscopic growth of *Alternaria solani* and *Botrytis allii* at 1·88 μgm. per ml., *Candida albicans*, *Fusarium oxysporum* f. *lycopersici* [*F. bulbigenum* var. *lycopersici*], *Penicillium notatum*, and *Saccharomyces cerevisiae* at 7·5 μgm., *Colletotrichum circinans*, *C. phomoides*, *Glomerella cingulata*, *Helminthosporium victoriae*, *Stemphylium sarciniforme*, and *Trichophyton mentagrophytes* at 3·75 μgm., *F. oxysporum* f. *pisi*, *Micrococcus pyogenes* var. *aureus*, and *Xanthomonas campestris* at 15 μgm., *H. sativum*, *Nigrospora sphaerica*, and *Verticillium albo-atrum* at 0·93 μgm., *Sclerotinia fructicola* at 1·88 μgm., and *Venturia inaequalis* at 0·47 μgm.

Leben (C.) & Keitt (G. W.). **Studies on helixin in relation to disease control.**—*Phytopathology*, 42, 3, pp. 168–170, 1952.

A partly purified preparation of helixin [see preceding abstract] was tested in the greenhouse at the Wisconsin Agricultural Experiment Station for plant disease protectant action by means of a technique using the tomato early blight organism (*Alternaria solani*) [*R.A.M.*, 23, p. 34; 28, p. 625]. The LD50 and LD95 values were shown to be 6·5 and 37·9 μgm. per ml., respectively. Both in agar streak tests with seven organisms (including *A. solani* and *Glomerella cingulata*) and in foliage experiments with early blight the antibiotic was less toxic at pH 3 and 4·7 than under more alkaline conditions. The results of assays on leaf disks sprayed first with helixin and then with a weak acid solution showed the antibiotic to be resistant to washing off by simulated rain and to be comparatively stable. In two series of tests the germination of tomato seed was inhibited by the semi-purified material at a strength of 25 μgm. per ml. and that of cabbage and maize at 100 μgm., while bean [*Phaseolus vulgaris*] sustained no injury from a concentration of 200 μgm. Damage was caused by the application of helixin to tomato roots at 180 μgm. per ml., and to tomato and cowpea cuttings by its absorption at dosages of 7·5 to 15 μgm. and upwards. It was harmless, however, when sprayed on the leaves of young bean, maize, cowpea, tomato, and wheat plants at 3 mg. per ml.

Raper (K. B.). **A decade of antibiotics in America.**—*Mycologia*, 44, 1, pp. 1–59, 1 pl., 1 diag., 3 graphs, 1952.

This Presidential Address to the Mycological Society of America in 1951 gives a general review of the work on antibiotics during the past decade [cf. *R.A.M.*, 30, p. 531]. It includes an account of the origin, development, therapeutic uses,

and curative properties of penicillin [ibid., 31, pp. 319, 345], streptomycin [ibid., 31, p. 480], chloramphenicol [loc. cit.], polymyxin [loc. cit.], aureomycin [loc. cit.], terramycin [loc. cit.], tyrothricin [ibid., 27, p. 41], bacitracin [ibid., 30, p. 597], and subtilin [ibid., 31, p. 29], together with the uses of antibiotics in supplementing diet, production statistics, and their role in national health. There is a brief list of diseases and uses for which no antibiotic has yet been developed. A bibliography of 82 titles is appended.

Babad (J.), Pinsky (A.), Turner-Graff (R.), & Sharon (N.). **An antifungal polypeptide produced by Bacillus subtilis.**—*Nature, Lond.*, 170, 4328, pp. 618–619, 1952.

Studies on cultures of *Penicillium roqueforti* [*R.A.M.*, 30, p. 424; 31, p. 346] at the Agricultural Research Station, Rehovot, Israel, revealed the inhibitory activity of *Bacillus subtilis* [ibid., 30, p. 59; 31, p. 540] against the growth of the fungus. The inhibiting substance was isolated and purified and proved to be a non-dialysable, heat stable polypeptide which was active against *Aspergillus niger* [ibid., 31, pp. 193, 340] at a concentration of 0·2 mgm. per ml. and against *P. roqueforti* at 0·05 to 1 mgm. per ml. The inhibitor, which differs from others obtained from *B. subtilis*, is mainly antifungal and its antibiotic spectrum is now under investigation.

Moreau (F.). **Sur un Penicillium du groupe brevi-compactum aux propriétés antibiotiques.** [On a *Penicillium* of the group *brevi-compactum* with antibiotic properties.]—*Bull. Soc. bot. Fr.*, 99, 4–6, pp. 163–166, 1952.

A study of *Penicillium brevi-compactum* [cf. *R.A.M.*, 25, p. 175] (a culture contaminant) showed that it possesses antibiotic properties [loc. cit.] associated with the presence of a 'curling factor' [ibid., 28, p. 232]. Antagonism was shown towards a number of fungi, including *Saprolegnia ferax*, *Triangularia bambusae*, *Gliocladium roseum*, *Fusarium arthrosporioides*, *F. oxysporum*, *F. sambucinum*, *F. solani*, and *Trichothecium roseum*, but only a few exhibited the 'curling'. The 'curling factor' appeared to be a chitin reactant, but its identity with griseofulvin [loc. cit.] remains to be established.

Mirzabekyan (R. O.). Действие микробов-антагонистов и их антибиотических веществ на ряд возбудителей бактериозов сельскохозяйственных культур. [The action of microbe antagonists and their antibiotic substances on a series of stimulators of bacteriosis in agricultural plants.] —Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 17, 5, pp. 34–38, 1952.

At the Microbiological Department of the Armenian S.S.R. Academy of Sciences, U.S.S.R., anti-bacterial substances were produced by several strains of actinomycetes, particularly by Nos. 15 and 15 (n), the latter from the Institute of Microbiology, U.S.S.R. Academy of Sciences. Two-year-old apricot and peach trees inoculated with *Bac[terium] armeniaca* and treated immediately or one to three days later with antibiotic 15 showed little or no infection and developed quite normally, while the untreated trees withered and died comparatively quickly. Treatment after six days prevented further withering and plants resumed normal growth, though remaining somewhat dwarfed. The results of field experiments with 15 and 15 (n), used at the rate of 200,000 to 300,000 anti-bacterial units according to the size of the tree and the degree of infection, were similar. Cotton gummosis (*B.* [*Xanthomonas*] *malvacearum*) [*R.A.M.*, 31, p. 327) was reduced by 67 to 84 per cent. depending on the period of exposure (from 6 to 24 hours) of naturally infected cotton seeds to the two antibiotics. Eight to 13 per cent. of the artificially inoculated cotton plants treated with 15 (n) became diseased, compared with 85

to 97 per cent. of the untreated; (15 (n) was the only antibiotic able to penetrate all parts of the plants. Pre-treatment with 15 and 15 (n) protected lemon and mandarin fruits inoculated with the citrus necrosis organism (*B. citriputeale*) [*Pseudomonas syringae*: ibid., 30, p. 464; 31, p. 183] strain No. 18, the antibiotics being much less effective when applied after inoculation.

KAVANAGH (F.), HERVEY (ANNETTE), & ROBBINS (W. J.). **Antibiotic substances from basidiomycetes IX. Drosophila subatrata (Batsch ex Fr.) Quél.**—*Proc. nat. Acad. Sci., Wash.*, 38, 7, pp. 555–560, 1 graph, 1952.

Further investigations in this series [cf. *R.A.M.*, 29, p. 272] by the Department of Botany, Columbia University, and the New York Botanical Garden, demonstrated the production by *Drosophila* [*Hypholoma*] *subatrata* [ibid., 27, p. 252] of four kinds of drosophilin, A inhibitory to the strains of staphylococci and *Bacillus subtilis* tested, B to most of the bacteria, C active to some extent against all Gram-positive bacteria, and D active against all bacteria, particularly the Gram-positive.

TEITELL (L.) & BERK (S.). **Prevention of mold growth in optical instruments. Panama Canal Zone exposure.**—*Industr. Engng Chem.* (*Industr.*), 44, 5, pp. 1088–1096, 9 figs., 1952.

Of five materials used for the treatment of binoculars in exposure tests in the Panama Canal Zone, *m*-cresyl acetate (cresatin) [*R.A.M.*, 27, p. 145] was the only one that completely prevented the growth of moulds [loc. cit. and ibid., 30, p. 530, *et passim*]. The compound was used in the form of capsules, each containing 0·5 gm. of 'taffy' (50 per cent. ethyl cellulose and 50 per cent. *m*-cresyl acetate), which were attached to the inside wall of the telescope body beneath a cover plate and outside the optical path. Cresatin vapour, or its hydrolysis products, proved to be very corrosive to the cupric oxide-blackened copper alloy prism shields.

BURNTHALL (E. V.). **The microbiological degradation of wool.**—*Canad. Text. J.*, 69, 10, pp. 62–65, 1952.

In this paper, read at a meeting of the Canadian Association of Textile Colorists and Chemists at McGill University, Montreal, on 19th January, 1952, useful information is presented on the fibre structure of wool, the environmental conditions contributing to a breakdown of its normal resistance to bacterial and fungal damage [cf. *R.A.M.*, 30, pp. 238, 483], and the prevention of microbiological degradation, primarily by the regulation of the relative humidity in the mill.

LOBANOV (N. V.). Микотрофность главнейших древесных и кустарниковых пород в условиях европейской части С.С.С.Р. [Mycorrhiza of the principal tree and shrub species under the conditions of the European part of the U.S.S.R.]—Агробиология [*Agrobiology, Moscow*], *1951*, 4, pp. 49–62, 6 figs., 1951.

Biological, ecological, and geographical studies from 1946 to 1950 of the mycorrhiza of 150 species in 90 families of trees and shrubs [*R.A.M.*, 30, p. 282 and next abstract] growing on various soils in the European part of the U.S.S.R. have shown that these fall into three groups, namely: highly mycotrophic, having both ecto- and endotrophic mycorrhiza irrespective of the growth conditions, e.g., most tree species; non-mycotrophic (even under forest conditions), such as shrubs with numerous root hairs, most fruit trees [loc. cit.], and leguminous plants; and slightly mycotrophic, i.e., having typical ectoendotrophic mycorrhiza under forest conditions only, such as the wild apple (*Malus sylvestris*). Ectotrophic mycorrhiza were found on one species of *Diospyros*.

To speed up mycorrhiza formation soils rich in mycorrhizal organisms should be added to improve the growth of highly mycotrophic species, such as oak, spruce [loc. cit.], and larch.

Shterenberg (P. M.). Грибная флора корней полевых растений. [The fungal flora of field plants.]—Агробиология [*Agrobiology, Moscow*], *1951*, 4, pp. 63–79, 3 figs., 1951.

The author used a simple method to detect endotrophic fungi in the fibrous roots of field plants such as perennial grasses, cereals (barley and wheat), cotton, and trees in the U.S.S.R. [see preceding abstract]. The roots were boiled in alkali for one to three hours (grasses and herbs) or two to four (trees) to clear and macerate the tissues, which could then be studied without sectioning. The fungi present were mainly endogenous and Fungi Imperfecti, the latter including *Alternaria*, *Helminthosporium*, and *Heterosporium* spp., all of which occurred, often together, mostly on young roots. The more vigorous development of endogenous fungi was associated with manuring (dung or superphosphate) and the more vigorous development of the host plant. The imperfect fungi were found in the roots and lower nodes of cereals. In healthy plants the mycelium spread in the intercellular spaces round the node fibres. In rot-infected winter and spring wheats the stem base, the lower nodes, the growing point of the node, and its vascular strands were all filled with mycelium. When plants are weakened by severe winter conditions and other unfavourable factors, the fungus develops vigorously and eventually kills them.

Damle (V. P.). **Enzymic study of certain parasitic fungi.**—*J. Indian bot. Soc.*, 31, 1–2, pp. 13–55, 11 figs., 4 graphs, 1952.

As a further contribution to the 'Studies in the physiology of obligate parasitism' carried out at the Imperial College of Science and Technology, London [cf. *R.A.M.*, 31, p. 321], a cultural comparison was made of 27 *Pythium* isolates from Slough soil on which damping-off of lettuce had occurred, comprising *P. debaryanum* [ibid., 31, pp. 5, 449], *P. ultimum* [loc. cit. and ibid., 31, p. 265], *P. intermedium* [ibid., 30, p. 419], and an unidentified *P.* sp. with spiny oogonia. There was marked antagonism between the *P.* sp. and any isolate of *P. debaryanum* or *P. intermedium*, the *P.* sp. growing readily through cultures of the other two which were completely arrested. A similar effect was observed in respect of pathogenicity when agar plates were inoculated with paired and single isolates and sown with surface-sterilized lettuce seed or planted with seedlings. The presence of *P.* sp. in a mixed culture clearly reduced the parasitic activity of *P. debaryanum* on the seedlings.

A selection of these isolates, together with others from culture collections, namely, two of *P. debaryanum* from lettuce and tomato, one of *P. ultimum* from lettuce, two of *P. intermedium* from *Kentia* and hops, and one of *Botrytis cinerea* from lettuce [ibid., 31, pp. 270, 320] were studied for their capacity to produce pectinase in a variety of media. Enzyme extracts were also obtained from living potato tubers parasitized by [an unspecified] *Pythium* at 25° C. and by *Botrytis* at 4°. The optimum pH for enzyme production by *Pythium debaryanum* No. 2 lay near 8; that for *B. cinerea* was pH 5·6 on a medium that remained acid throughout, but pH 8 when alkaline. The thermal inactivation point of *Pythium* enzyme was 45° to 50° after heating for two minutes and 60° to 65° for *Botrytis* enzyme under the same conditions. Enzyme production on artificial media was best when the phosphate was autoclaved with the carbohydrate under alkaline conditions.

There was a correlation between the capacity of the *Pythium* spp. to produce pectinase and their ability to parasitize potato [cf. loc. cit.] and lettuce tissues,

P. debaryanum and *P. ultimum* being the most active in both respects. In addition to the pectinase, culture extracts of *P. debaryanum* contained a thermostable toxin lethal to the plant tissue, lettuce seed being killed by it.

Fischer (R.). **Ursachen und Bekämpfung der Gelblaubigkeit (Chlorose).** [Causes and control of foliar yellowing (chlorosis).]—*Pflanzenarzt*, 5, 6, pp. 2–4, 1952.

Following a general introduction to the subject of chlorosis in plants [cf. *R.A.M.*, 31, p. 297], the author describes six different forms of the disorder associated, respectively, with iron deficiency, defective soil aeration, lack of proportion between carbon dioxide assimilation and uptake of mineral substances, other nutrient deficiencies, presence in the soil of root-toxic substances, and adverse meteorological factors. Appropriate control measures are indicated where practicable.

Kassanis (B.). **Some factors affecting the transmission of leaf-roll virus by aphids.** —*Ann. appl. Biol.*, 39, 2, pp. 157–167, 1 pl., 1952.

In this full account of studies at Rothamsted Experimental Station, Harpenden, Herts., some of which has been noted previously [*R.A.M.*, 31, p. 170], *Myzus persicae* aphids became infective more readily when fed on recently infected *Datura tatula* showing only slight symptoms of leaf roll [ibid., 31, p. 200] than on older plants with pronounced chlorosis. Similarly, young potato sprouts with no symptoms were better sources of virus than older plants with severe leaf roll. The differences in symptom severity exhibited by potato plants in the field were found to be due mainly to differences in the virulence of accompanying strains of potato virus X [ibid., 29, p. 168], although leaf roll virus isolates differing in virulence were also found.

Henner (J.) & Schreier (O.). **Untersuchungen über das Auftreten von Blattläusen an Kartoffeln in Österreich in den Jahren 1950–1951 im Zusammenhang mit virösem Kartoffelbau.** [Studies on the occurrence of aphids on Potatoes in Austria in the years 1950–1951 in relation to viroses in Potato cultivation.]—*PflSchBer.*, 8, 9–10, pp. 150–159, 4 graphs, 1952. [English summary.]

With a view to the delimitation of healthy potato seed-producing areas from those favouring virus-induced degeneration in Austria [*R.A.M.*, 28, p. 377], the aphid populations of the Ackersegen and Allerfrüheste Gelbe varieties were investigated in 11 localities in 1950 and 1951, using the 100-leaf method [ibid., 29, p. 274]. *Myzus persicae* predominated in both years, but the total aphid population was small and alatae were of little importance in the dissemination of infection [cf. ibid., 31, p. 200]. The degree of degeneration corresponded to the extent of aphid colonization. Allerfrüheste Gelbe tended to harbour larger numbers of aphids than Ackersegen. These results indicate that Davis's method (*Bull. ent. Res.*, 23, pp. 535–548, 1932) of evaluating areas for seed production is sound but further tests are necessary.

Keleny (G. P.). **The detection of necrosis in leaf roll infected Potato stems by means of fluorescence microscopy.**—*J. Aust. Inst. agric. Sci.*, 17, 4, pp. 203–206, 1952.

The results are presented of experiments made at the Division of Plant Industry, Canberra, to compare the efficiency of Sheffield's phloroglucinol test as modified by Hutton and Oldaker [*R.A.M.*, 28, p. 538; 29, p. 426] and Bode's fluorescence test [ibid., 27, p. 123] in showing the distribution of phloem necrosis [ibid., 31, p. 450] along the whole length of the stems of nine varieties of potato infected with leaf roll virus. Bode used both rhodamine B and coriphosphine at 1 in 20,000 in

a sodium dihydrogen phosphate buffer of pH 2, but the author employed a 1 in 10,000 concentration.

The results indicated a tendency for maximum symptom development to occur at approximately the fifth or seventh node. They confirmed Bode's claim that his method is superior to the phloroglucinol test, as his own seems to reveal a greater number of necrotic cells, at a greater intensity, and at an earlier stage of development. It remains possible, however, that the fluorescence technique may stain phloem elements altered by some means other than virus degeneration and may, therefore, not indicate true leaf roll infection in every instance. In several stems of varieties other than Factor [Up-to-Date] and Katahdin the fluorescence technique gave a positive reaction, whereas the phloroglucinol test disclosed no trace of phloem necrosis.

Foister (C. E.), Wilson (A. R.), & Boyd (A. E. W.). **Dry-rot disease of the Potato. I. Effect of commercial handling methods on the incidence of the disease.**—*Ann. appl. Biol.*, 39, 1, pp. 29–37, 1952.

This investigation of various problems associated with dry rot of seed potatoes in Great Britain caused by *Fusarium caeruleum* [*R.A.M.*, 30, pp. 72, 385, and next abstracts] was begun in 1942 under the joint auspices of the Agricultural Research Council and the Department of Agriculture for Scotland [ibid., 24, p. 201; 27, p. 292]. Hand-picking, hand-riddling, and the use of rubber-spool graders or rubber-coated screens reduced infection by varying amounts in stocks of the susceptible varieties Doon Star and Arran Pilot grown in Scotland mostly in fields known to be dry-rot infested. For example, the percentage dry rot in March, 1948, in Arran Pilot tubers graded by five different methods was as follows: (*a*) mechanical reciprocating riddle (bare wire screen) 9·4, (*b*) as before but with rubber-coated screen 4, (*c*) American rubber-spool grader 3·5, (*d*) hand riddle (bare wire screen) 2·3, and (*e*) hand-picked 1·5.

In one experiment in 1942 counts made on 155 diseased tubers from a stock of Arran Pilot showed that 77 per cent. of the dry rot lesions originated from, or were associated with pustules of powdery scab (*Spongospora subterranea*) [ibid., 27, p. 292]. Dry rot frequently occurs as a secondary infection in tubers affected with blight (*Phytophthora infestans*). It is interesting to note that no dry rot lesions were found in association with growth cracks or damage caused by wireworms or slugs during the investigation.

McKee (R. K.). **Dry-rot disease of the Potato. II. Fungi causing dry rot of seed Potatoes in Britain.**—*Ann. appl. Biol.*, 39, 1, pp. 38–43, 1952.

Further studies in this series [see preceding and next abstracts] were made at the University of Nottingham School of Agriculture, Sutton Bonington, Leics. An examination of 144 samples of seed potatoes affected by dry rot, comprising 1,218 tubers, disclosed parasitic species of *Fusarium* in 91 per cent. of the lesions, *F. caeruleum* [loc. cit.] occurring in 93 per cent., *F. avenaceum* in 6 per cent. [*R.A.M.*, 25, p. 182], and *F. arthrosporioides* [ibid., 25, p. 13; 31, p. 493] and *F. tricinctum* in less than 1 per cent. each. The last-named species has not previously been recorded on potato in the British Isles. A modified method for the identification of *F. caeruleum* was adopted on the discovery that typical sporulation occurred within a few days on small pieces of rotted tuber tissue kept on moist filter paper in Petri dishes at a high humidity. Specific identification of isolates other than *F. caeruleum*, however, could only be made from mature cultures. In King Edward a much higher proportion of dry rot lesions is caused by *F. avenaceum* than in the other common varieties. It is, however, relatively resistant to the disease as a whole; Home Guard is also somewhat resistant.

McKee (R. K.) & Boyd (A. E. W.). **Dry-rot disease of the Potato. III. A biological method of assessing soil infectivity.**—*Ann. appl. Biol.*, 39, 1, pp. 44–53, 1 fig., 1952.

In the course of studies at Nottingham University School of Agriculture on dry rot of potatoes [see preceding abstracts] living tubers of the variety Doon Star were inoculated in mid-winter by a standard method with small quantities of soil and held under conditions conducive to infection. The number of dry rot lesions that developed was regarded as a measure of the soil infectivity; expressed as a percentage of the total number of inoculations it gave the 'infectivity index' of the soil.

In these experiments 91 per cent. of the lesions were caused either by *Fusarium caeruleum* or by a few other *F.* species of which the most common was *F. avenaceum* [loc. cit.]. In most cases the lesions caused by these two species on Doon Star tubers were distinguished by the colour of the rotted tissues when cut. Isolations showed that 85 per cent. of the diagnoses made in this way were correct.

The consistency of results was tested by making five replicate estimations (each based on 100 inoculations) of the infectivity index for each of nine field soils, some made from a single sample of the soil in question and others made singly from each of five entirely separate samples from each field. Considerable variation occurred between replicate estimations of the infectivity index of the same soil, but it is of interest that the variation between separate samples from the same field was no greater than that found in replicates of the same soil sample. The most important factor in obtaining reproducible results appears to be the maintenance of adequate humidity immediately after inoculation.

Indirect evidence as to the numbers of *F. caeruleum* spores necessary for various levels of infection was obtained by inoculating Doon Star tubers with drops of a spore suspension containing a known number of spores. Inoculation with about 15 spores gave 70 per cent. infection, a figure much higher than the *F. caeruleum* index of most field soils. The proportion of successful inoculations depends, within limits, on the number of spores present. For the time being the infectivity index must be regarded as a measure of infectivity rather than infestation.

The latter experiment also demonstrated that contrary to the accepted opinion tuber susceptibility decreased with age. The series of inoculations on dormant tubers in early March showed a maximum of 98 per cent. infection, while sprouting tubers inoculated in late May gave a maximum of only 75 per cent.

Lušin (Vera). **Ružičasta gnjiloća Krumpira.** [Potato pink rot.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 64–69, 2 pl., 1 map, 1952. [English summary.]

Phytophthora erythroseptica [C.M.I. map. No. 83], found in 1951 on potatoes in the vicinity of Zagreb and near Brinje, Lika, has not previously been reported in Yugoslavia. Its distribution in other parts of the country is still undetermined. The morphological and biological properties of the fungus and its control measures are briefly described.

Gregor (J. W.) & Gallie (R. J. L.). **Research programme. Potatoes.**—*Rep. Scot. Soc. Res. Pl. Breed., 1952*, pp. 22–27, 1952.

In the course of potato breeding work in Scotland [cf. *R.A.M.*, 30, p. 99] for resistance to *Phytophthora infestans* [cf. ibid., 31, p. 349] isolates from Scotland, England, Belgium, Kenya, Southern Rhodesia, South Africa [ibid., 31, p. 537], and Peru were found to contain three new biotypes. These, with the seven strains previously isolated, made it possible to formulate a comprehensive scheme of inter-relationships between the genes controlling host hypersensitivity and the

biotypes of the pathogen. This scheme includes all known biotypes and postulates several additional forms capable of differentiation by the host genotypes that have been produced [loc. cit.]. It illustrates the relationships between 16 genetically different hosts and 16 different strains of the fungus (ten known and six theoretical). It accordingly becomes possible to calculate the segregation-ratios to be expected from the mating of any pair of genotypes when infected with any strain or group of strains of the pathogen.

Each strain, being adapted to a particular *Solanum* genotype, presumably its natural host, is more prolific on it than on any other. The evidence suggests that strains with the widest host range are least virulent in relation to commercial potato varieties and would be unlikely to survive under natural conditions in competition with the more prolific common strain. These new strains would probably not have been discovered if hypersensitive varieties, against which the common strain is ineffectual, had not been bred. Hence, new resistant varieties render possible the detection of new biotypes which probably occur frequently in potato crops, but which would otherwise remain undiscovered. No new genes appear to be present in Dutch or American potato hybrids and specialization in *P. infestans* seems to follow the same pattern in Scotland as in Holland and the United States. The continued appearance of new strains of blight suggests that permanent resistance through hypersensitivity may not be possible, at least in certain climatic areas.

The selection 1253 a (12) [ibid., 30, p. 100], field immune from virus B [strain of virus X], is now registered under the name Pentland Ace. It was selected from a fourth generation progeny of crosses involving *S. rybinii*, *S. demissum*, and *S. tuberosum*. Arrangements have been made for its further multiplication in Aberdeenshire in 1952.

Four strains of virus X were studied, three of German origin able to kill potato varieties carrying either or both of the genes Nx and Nb [ibid., 27, p. 580], and one of American origin which failed to kill a number of varieties carrying both. It would seem that the German strains are more primitive and the American more advanced than the strains of X so far recovered from Scottish potatoes. The American strain is potentially a danger to established varieties field immune from the local strains of the virus. No strain tested has completely overcome the immunity of U.S. seedling 41956 [ibid., 26, p. 122], which appears to be due partially, if not entirely, to hypersensitive response. Macroscopic symptoms of this response took the form of small, discrete, necrotic spots on leaves borne by axillary shoots of young immune seedlings grafted with X-infected scions. In no instance did a full, systemic, necrotic disease develop on such plants, and their tubers were all free from the introduced virus. Immune responses were found in two lines of *S. acaule*, Commonwealth Potato Collection Nos. 379·1 and 2106·1, the parents of the former being, apparently, homozygous and those of the latter heterozygous for the character. In other lines necrotic reactions were noted resembling those conditioned in some species by the gene Nx; they were shown by all seedlings derived from C.P.C. Nos. 2060·2, 2112·3, 2113·2, and 2114·3, but in only a proportion of the progenies 2104, 2108·3, 2109·3, and 2111·1.

In studies on the inheritance of necrotic responses to virus Y [cf. ibid., 29, p. 48] examination of tetraploid material derived from *S. demissum* (C.P.C. 2167), *S. simplicifolium* (C.P.C. 51 *a*), and cultivated varieties indicated that in all three sources similar, if not identical, genes control reaction to virus Y. The relationship, however, between necrotic reaction and resistance to Y in *S. rybinii* and the section *Longipedicellata* persists in seedling progenies, and this resistance appears to be based on a hypersensitive response of a type closely resembling that found in relation to immunity from virus X.

In field trials from 1948 to 1950, 11 seedlings were selected for their potential

value for further breeding, four because of high resistance to leaf roll and seven for resistance to Y.

Investigation into the spread of virus X in commercial stocks of Majestic derived from a common parental stock confirmed the initial similarity of the stocks with regard to content of virus X and indicated that environmental factors markedly affect the expression of disease symptoms and probably the rate of virus spread.

A stunting disease in a commercial seed crop of Majestic potatoes was tentatively diagnosed as unmottled curly dwarf [strain of potato spindle tuber virus: cf. ibid., 30, p. 577], not apparently recorded previously in Scotland.

A disease which appeared late in the season in 1949 and spread rapidly in experimental plots of Arran Victory and Kerr's Pink was due to witches' broom virus [cf. ibid., 29, p. 273; 31, pp. 53, 332]; no further spread was observed in 1950 or 1951.

Davis (G. N.), Stevenson (F. J.), & Wright (D. N.). **Potato varieties in Kern County, California.**—*Bull. Calif. agric. Exp. Sta.* 727, 15 pp., 1951. [Received October, 1952.]

This bulletin presents information on plant and tuber characteristics and disease resistance of 30 potato varieties tested (in comparison with White Rose, the commercial variety usually grown) over a period of ten years at the United States Cotton Field Station, Shafter, Kern County, California, all the 'seed' planted, except White Rose, being grown by the United States Department of Agriculture in Maine. Most of the potato land in Kern County is heavily infested with scab [*Actinomyces scabies*: *R.A.M.*, 29, p. 51], some so heavily that it has been abandoned for potato production. Several potato varieties and seedlings resistant to scab in other parts of the United States have not maintained their resistance under Californian conditions.

Of the varieties tested Menominee [ibid., 24, p. 245; 29, p. 372] and Ontario [ibid., 31, p. 204] showed very high resistance to scab when grown on some of the most severely infested soil in the county; Cayuga [loc. cit.] was also resistant. The resistant features [? in California] of the varieties grown are summarized as follows: Kasota tolerant of *Fusarium* wilt [*F. solani* var. *eumartii*: ibid., 22, p. 271; 27, p. 86]; Essex [ibid., 29, p. 430], Kennebec [ibid., 28, p. 139], Sebago [ibid., 29, p. 372], Potomac, and Calrose resistant to late blight [*Phytophthora infestans*: cf. ibid., 28, p. 352]; Houma [ibid., 30, p. 625] and Katahdin [ibid., 29, pp.168, 425] resistant to leaf roll virus; Chippewa, De Soto, Earlaine, Houma, Katahdin, Kennebec, Mohawk, and Red Warba to mild mosaic [virus: ibid., 29, p. 372]; Chippewa, Katahdin, and Kennebec to net necrosis [virus: ibid., 29, p. 168]; Saranac and Teton to ring rot [*Corynebacterium sepedonicum*: ibid., 28, p. 353; 29, p. 372]; and Menominee to *Verticillium* wilt [*V. albo-atrum*: cf. ibid., 27, p. 119].

Bugnicourt (F.). **Contribution à l'étude systématique de deux micromycètes parasites du Riz.** [A contribution to the systematic study of two microfungi parasitic on Rice.]—*Rev. gén. Bot.*, 59, 702, pp. 413–420, 2 pl., 1952.

Details are given of the history, distribution, nomenclature, and biology of *Trichoconis padwickii* [*R.A.M.*, 29, p. 329] and *Helicoceras oryzae* [ibid., 20, p. 423; 23, p. 119] on rice. The former is the dominant species on rice grains in Indo-China, 36·2 per cent. of 4,500 grains of 45 varieties yielding the fungus, which was present on all the varieties. It was less prevalent on samples from the Pacific Islands. It is studied in comparison with the closely related and probably synonymous species *T. caudata* [ibid., 30, p. 539]. An analogy is drawn between *H. oryzae*, which is of rare occurrence in Indo-China and was not present on Pacific or Australian rice, and *Helicoma echinosporium* [ibid., 12, p. 533], which occurs in Japan.

Subba Rao (N. V.). **Some organo-mercury compounds of amides and imides as fungicides.**—*J. sci. industr. Res.*, 11 B, 1, pp. 8–9, 1952.

At Hyderabad, Deccan, India, mercury carbamide, mercury succinimide, and mercury phthalimide were tested in comparison with ceresan and formalin-charcoal dust for the control of rice foot rot (*F*[*usarium*] *moniliforme*) [*Gibberella fujikuroi*: *R.A.M.*, 27, pp. 155, 314]. Mercury succinimide, used either as a dust at a dilution of 1 in 9 or as a steep (1 in 500, 30 minutes), was equally effective with ceresan in the reduction of infection; the carbamide and phthalimide were satisfactory only as undiluted dusts (0·5 gm. per lb. of seed). The percentages of foot rot in four replications of the plots treated with the mercury succinimide dust were 6·1, 3·1, 3, and 2·7, and with the steep 1·9, 4·7, 3·4, and 5·1, compared with 1·9, 2, 0·9, and 2·4 for ceresan (1 gm. per lb.), and 36·3, 47·8, 35·2, and 30·7 for the untreated.

Young (H. E.). **Root disease in replanted areas.**—*Quart. Circ. Rubb. Res. Inst. Ceylon* (formerly *Quart. Circ. Ceylon Rubb. Res. Sch.*), 27, 1–2, pp. 19–23, 1952.

The practice of poisoning old rubber trees or stumps and replanting between them, which is becoming common in Ceylon, may assist in spreading root attack by *Fomes lignosus*, *F. noxius*, and *Poria hypobrunnea* [*R.A.M.*, 19, pp. 114, 674; 20, p. 127; 31, p. 205], tree poisons such as sodium arsenite having no effect on parasitic fungi present on the roots. Mechanical uprooting is economical, costing 42 cents per tree at the Rubber Research Institute. One monkey grubber at Rs. 950, operated by four labourers, can uproot 26 trees per day. The large laterals are pulled out with the tree and can be inspected for the presence of disease. Timber left to rot is quite safe on uninfected ground.

When a plant is found to be affected by root disease the first step in control is to discover the source of infection by following the roots outwards in all directions until the originally affected stump or root is disclosed. This must be removed and burnt on the spot as must all timber and other infected debris with typical mycelium. If one or more roots of an adjacent rubber tree are also affected, though the foliage may be healthy, they should be cut back to healthy tissue and the cut ends tarred, or if necessary the whole tree should be removed. A trench two feet deep should be dug round the infected area and kept clear until the infection is eliminated. All soil removed must be deposited on the site. The essential condition of successful control is to eradicate the fungus completely in the early years of clearing, and this treatment though expensive will more than pay for itself by preventing the reoccurrence of the large disease complexes now present on many old estates. The treated area should be kept free from creeping cover crop for about two years, but should be thickly planted with *Crotalaria anagyroides*. This plant is susceptible to root disease and the presence of diseased bushes will indicate the existence of a piece of infected wood overlooked in the original exploration. The *Crotalaria* plants must be lopped only lightly or they will die back. Any vacancy resulting from root disease should be promptly supplied with a budded stump, provided the clearing is not older than two years from the time of budding. 'Stumped' buddings may be used as supplies for a further year, after which it becomes uneconomic to supply vacancies unless they occur in a group.

In affected clearings these measures should be supplemented by periodical examination of the roots of every plant to disclose and remove the source of infection with minimum delay and save young plants which would otherwise succumb. Three rounds of inspection should be made at intervals of four months, then two at six months. At the end of the two years the fungus should have been almost completely eradicated.

In new plantings on jungle land one or two infections generally occur, caused by the natural presence of the fungus on jungle roots and stumps. Such cases when found should be treated in the same way.

As *F. lignosus* requires unrotted wood for its needs, infection on small roots usually disappears quickly, whereas on large pieces it persists as long as they take to rot. At the Rubber Research Institute living *Fomes* was found on stumps up to four years old.

YOUNG (H. E.). **Leaf mildew of Rubber—a review.**—*Quart. Circ. Rubb. Res. Inst. Ceylon* (formerly *Quart. Circ. Ceylon Rubb. Res. Sch.*), 27, 1–2, pp. 3–15, 1952.

In this paper the author reviews and summarizes the information so far available [with over three pages of references] on rubber mildew (*Oidium heveae*) [cf. *R.A.M.*, 31, p. 205] with special reference to the conditions prevailing in Ceylon. The main items dealt with include the geographical distribution of the disease [C.M.I. map No. 4], its origin, the nature and life-history of the causal organism, damage caused, susceptibility [cf. ibid., 31, p. 83], crown budding and breeding for resistance [loc. cit. and next abstracts], spread, and control by cultural practices and chemicals [cf. ibid., 10, p. 486; 11, p. 126; 30, p. 342, *et passim*].

The writer verified Bobilioff's observation that spread of infection in any estate depends on the direction of the air currents carrying the spores [cf. ibid., 8, p. 461] and demonstrated that the spores survive for only about 1½ minutes in sunlight.

A new type of dusting machine is now available in Ceylon, the Noidium, which is more satisfactory than the Whirlwind [cf. ibid., 31, p. 517] because of its lighter weight. The type and fineness of sulphur used are important. The standard U.S.A. 325-mesh and the British 300-mesh are highly satisfactory and are of adequate purity; coarser grades are not recommended. Activated sulphur [cf. ibid., 28, p. 375] has given good results at half the dosage rate of ordinary sulphur.

YOUNG (H. E.). **Crown budding for Oidium resistance.**—*Quart. Circ. Rubb. Res. Inst. Ceylon* (formerly *Quart. Circ. Ceylon Rubb. Res. Sch.*), 27, 1–2, pp. 16–18, 2 figs., 1952.

During the Japanese occupation of Java tests of rubber trees crown-budded with Java clone LCB 870, resistant to *Oidium heveae* [*R.A.M.*, 31, p. 83 and preceding and next abstracts], showed that the yield of the seedling stocks so budded was only 75 per cent. of that of comparable unbudded seedlings at the same height. This effect appeared to extend to a distance of at least 100 cm. below the union, but at 150 cm. the yield equalled that of the unbudded seedlings. Therefore, top-budding should be effected at a height of 250 cm. to obtain an unaffected tapping panel at least 100 cm. from ground level.

Budded stumps or clonal seedlings are most suitable for crown budding when brown bark has developed to the required height, which should be not less than 8 ft. When the bud has taken the top of the tree is cut off about 6 in. above the bud. During the next few weeks all the panel shoots are removed to ensure that only the LCB 870 bud grows.

At high altitudes in Ceylon where yields have been reduced by infection to under 400 to 500 lb. per acre, renewals and new plantings should be crown budded to ensure an economic yield. In low country areas where loss is slight crown budding with LCB 870 should be carried out where damage from *O. heveae* normally occurs.

HUNTLEY (G.). **Oidium and sulphur.**—*Quart. Circ. Rubb. Res. Inst. Ceylon* (formerly *Quart. Circ. Ceylon Rubb. Res. Sch.*), 27, 1–2, pp. 23–28, 1952.

The author questions the efficacy and durability of sulphur dusting for the control of *Oidium heveae* on rubber [see preceding abstracts] and puts forward suggestions for the way in which breeding might proceed to obtain high-yielding, early maturing, non-deciduous trees with a thick cuticle which might be immune or escape the disease.

Dr. H. E. Young, answering these queries, states that sulphur is still a good remedy, but with the increase of fungus population must be applied carefully and before the disease appears or it will probably be too late. The rate of application advocated in the early days when control was established was 10 to 12 lb. per acre per round, and this rate is still advised. When the dosage was reduced during the depression and because of *Phytophthora* [spp.: cf. *R.A.M.*, 28, p. 195; 29, p. 170] control was poor. It has now been established that clone CHM2, which according to the author is like PB 86, a non-wintering type, is the same as LCB 1320 and appears to have a normal cuticle, not a thick one like PB 86. Endeavours are being made to breed a clone with the LCB 870 [see preceding abstract] type of cuticle, the only clone possessing it, by crossing with high yielding clones.

Hunter (J. G.) & Vergnano (O.). **Nickel toxicity in plants.**—*Ann. appl. Biol.*, 39, 2, pp. 279–284, 1952.

Crops in several small areas of Aberdeenshire, Scotland, are seriously affected by nickel toxicity due to the abnormally high nickel content of the soil [*R.A.M.*, 27, p. 336]. Oats were the most characteristically affected, showing white necrotic longitudinal stripes on the leaves and a certain degree of chlorosis. Other symptoms are similar to those of common deficiencies. The principal area affected, a poorly drained basin near Whitecairns, consists of acid peat soil (pH 4·5 to 5·3) in the basin and a loam or peaty loam (pH 5·6 to 6·7) on the surrounding hill slopes. In the basin soils the amount of nickel soluble in 2·5 per cent. acetic acid was 114 to 289 p.p.m. and the exchangeable nickel 26 to 61 p.p.m., and in the hill-slope soils 49 to 403 and 22 to 49 p.p.m., respectively. The nickel content of the fully expanded leaves of oat plants in the basin was 17 to 134 p.p.m. and 16 to 51 p.p.m. in the hill slopes. In the basin the leaves generally contained more than the stems, the young parts more than the old, the leaf blades more than the sheaths, the flowers more than the peduncles, and the grain more than the straw. Nickel uptake was proportional to the acetic-soluble or exchangeable nickel contents only in soils of similar pH; it was related primarily (inversely) to the soil pH. The reduction in plant growth and the degree of necrotic symptoms produced were increased when the calcium, magnesium, nitrogen, or potassium supply was low or when phosphorus was high.

The most satisfactory and practical remedy for nickel toxicity is the application of lime with nitrogenous and potassic fertilizers, phosphate being applied only in sufficient quantities to prevent phosphorus deficiency. Where the soil pH is already high lime should not be given, as manganese deficiency might result. The effectiveness of calcium carbonate in preventing or reducing the severity of nickel toxicity is due to the reduction in nickel availability by the increase in soil pH. The acetic-soluble nickel content is not necessarily altered by the application of calcium carbonate. The effect of pH on nickel uptake by plants growing in soil differs entirely from that in water culture, when considerably more nickel is absorbed at high pH levels than at low.

Of various other crops examined for nickel toxicity in field experiments barley was the least affected, wheat, Italian ryegrass [*Lolium multiflorum*], and tick bean [*Vicia faba*] only slightly, and clover, turnip, swede, potato, cabbage, and kale severely, but these last improved with lime and fertilizers. Fodder beet was the most severely affected and showed little improvement after treatment.

Schuster (M. L.) & Christiansen (D. W.). **A foot and root disease of Safflower caused by Puccinia carthami Cda.**—*Phytopathology*, 42, 4, pp. 211–212, 1 fig., 1952.

Of 257 safflower plants collected from a disease nursery in western Nebraska on 7th June, 1951, 252 (98 per cent.) bore pustules of rust (*Puccinia carthami*) [*R.A.M.*,

28, p. 309 and next abstract] on the underground parts of the stems and on the tap and lateral roots. The authors are not aware of any previous report of root infection by a non-systemic rust.

The sudden and widespread dissemination of the pathogen shortly after safflower introduction on a commercial scale has been attributed to seed transmission, but in greenhouse experiments infection was also induced by soil infestation with diseased leaves. The primary zone of infection extends from the transition area to the cotyledons. Longitudinal cracking of the epidermal and cortical tissues, due in part to the adventitious roots emerging at the points of infection, is very prevalent. The first symptoms, consisting of faint foliar discoloration and wilting, were observed on plants in the six- to eight-leaf stage, but seedlings often die suddenly without any external sign of attack. Initial infection of the hypocotyl usually causes hypertrophy. Girdling of invaded areas, a typical feature of the disease in older plants, is a sequel to tissue collapse in the later stages of growth and frequently culminates in breaking under the influence of rain or wind.

Stems and roots were found to contain internal teleutospores, most of the sori being isolated and connected only by mycelium to the superficial pustules. The cell wall is apparently ruptured by the pressure of the developing sorus. Larger internal pustules seem to result from the coalescence of adjacent and simple sori. Internal sporulation is most common in cortical tissue but occasionally occurs in the stele of mature plants.

Treatment of a seed lot averaging 102 teleutospores per seed with 2 oz. ceresan M per bush. did not effect complete control, which was obtained, however, in another batch with only 14 spores per seed. Seed treatment failed to eliminate the foot and root rot phases of the disease when infection proceeded from the soil, indicating that over-wintered inoculum there may be of economic importance.

McGregor (W. G.) & Hay (W. D.). **Safflower—Canadian experiments.**—*Sci. Agric.*, 32, 4, pp. 204–213, 1 pl., 1952.

In this account of the safflower and its cultivation and breeding work in Canada, a brief review is given of the common safflower diseases in the Dominion. In 1950 slight to moderate attacks of rust (*Puccinia carthami*) [see preceding abstract] were noted on most varieties except N. 6 and N. 852, while 80 per cent. of the latter were damaged by root rot due to a species of *Fusarium* [*R.A.M.*, 28, p. 309] on irrigated plots at Lethbridge, where 3 per cent. of the plants were affected by the same disease in 1945. Because of its susceptibility to root rot, which is more prevalent on irrigated than on dry land, N. 9 had to be abandoned altogether. A wilt was also observed in the same locality in 1949, but some strains from Nebraska proved very resistant to it. Leaf spot due to *Macrosporium carthami* [loc. cit.] was reported from Ottawa and Winnipeg.

Thomas (C. A.). **A greenhouse method of evaluating resistance in Safflower to Phytophthora root rot.**—*Phytopathology*, 42, 4, pp. 219–221, 1952.

A description is given of the technique and results of greenhouse experiments performed at the Plant Industry Station, Beltsville, Maryland, to evaluate resistance to *Phytophthora drechsleri* in varieties and selections of safflower from Nebraska [*R.A.M.*, 31, p. 351]. Plants were grown in steamed soil in 6-in. pots on which was poured a mycelial suspension. The susceptible variety N(ebraska) 9 [ibid., 31, p. 206] was effectively eliminated by inoculation at sowing time or after periods of one to five weeks at a soil temperature of 25° or 30° C. but not at 20°. Fifty per cent. or more of the plants of the resistant N. 8 were killed at 20°, 25°, and 30° by inoculation at sowing time and at 30° when inoculated one week old. Resistant and susceptible varieties could be clearly differentiated by the inoculation of

one-week-old plants at 25° or those of a fortnight or more at 30°. The reactions of several varieties and selections in the greenhouse tests were similar to those observed under field conditions in the Imperial Valley of California in the spring of 1951.

JONES (W.). **Infection of basal shoots of Hop plants by Rhizoctonia solani.**—*Sci. Agric.*, 32, 2, pp. 114–115, 1 pl., 1952.

A new, unrecorded disease of hops caused by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 27, p. 346] was observed in a 50-acre hop yard of the Brewer's Gold variety in British Columbia in 1950. The disease, occurring on the young basal shoots of the plants, has all the symptoms characteristic of *Rhizoctonia* infection. Field trials showed that the best method of preventing a recurrence of the disease was to leave the crowns exposed after the cutting operation.

SHEFFIELD (F[RANCES] M. L.). **Studies of the Clove tree. IV. Natural grafting and its bearing on sudden-death disease.**—*Ann. appl. Biol.*, 39, 1, pp. 103–110, 2 pl., 1952.

Since experimental grafting between cloves is very difficult with shoots and so far has proved impossible with roots, naturally occurring grafts were used in further studies on the nature and transmission of sudden death disease in Zanzibar [*R.A.M.*, 30, p. 580]. Volunteer seedlings often grow up closely adpressed to old trees. If the latter died from the disease the saplings usually survived, but occasionally they died almost simultaneously. In these cases the sapling roots were found to be naturally grafted to those of the old tree, while those which survived, although closely adpressed to the old tree, had no organic connexion with it. These observations indicate that the disease can be attributed only to a pathogenic agent.

VIENNOT-BOURGIN (G.). **Les rouilles du Strophanthus sarmentosus en Afrique occidentale et équatoriale française.** [Rusts of *Strophanthus sarmentosus* in French West and Equatorial Africa.]—*Rev. int. Bot. appl.*, 32, 351–352, pp. 2–14, 3 figs., 1952.

Attention is drawn to damage inflicted by *Hemileia strophanthi* and *H. smallii* [*R.A.M.*, 29, p. 333] on cultivated specimens of *Strophanthus sarmentosus* and on seedlings, the former in the Ivory Coast and the latter in Ubangi-Chari. *H. strophanthi* has previously been reported from Java on *S. dichotomus* and from Uganda on *S. hispidus* [loc. cit.], but in the Ivory Coast it appears to be confined to the one host species. Detailed descriptions of these species are given and also an identification key including *H. buntingii* (*Kew Bull.*, *1940*, p. 219) which attacks *S. hispidus* in the Gold Coast and Uganda. *H. buntingii* and *H. strophanthi* produce uredo- and teleutospores but, so far, *H. smallii* is represented only by uredospores.

VIENNOT-BOURGIN (G.). **Ustilaginales d'Afrique (première note).** [The Ustilaginales of Africa (first note).]—*Rev. Mycol.*, 16, *Suppl. colon.* 2, pp. 101–106, 2 figs., 1951. [Received April, 1952.]

Descriptions are given of *Ustilago heterospora*, a widespread cause of bunt of *Panicum maximum* seed [*R.A.M.*, 7, p. 712] in Africa, samples having been received from Yaoundé in the Cameroons, the Adiopodoumé savannah, Ivory Coast, and the French Sudan, and *Sorosporium loudetiae* in the seed of *Loudetia* sp. [ibid., 31, p. 503] in the Cameroons.

MOREAU (C.) & MOREAU (MIREILLE). **Sur quelques Hyphomycètes.** [On some hyphomycetes.]—*Bull. Soc. linn. Normandie*, Sér. 9, 6, pp. 71–82, 5 figs., 1951.

Continuing their morphological studies on hyphomycetes [cf. *R.A.M.*, 27,

p. 46], the authors give notes on various species including *Tritirachium album* [cf. ibid., 22, p. 180; 28, p. 348; 30, p. 528] isolated from a wheat rhizosphere in Calvados; *Periconia pycnospora* [ibid., 7, p. 201; 29, p. 537] also from a wheat rhizosphere; *Stachybotrys atra* [ibid., 30, pp. 383, 528, 623, *et passim*] from soil round roots of wheat and barley in Normandy; *S. subsimplex* [cf. ibid., 24, p. 389] from cacao trees in the Ivory Coast; and *Epicoccum purpurascens* [ibid., 28, p. 487] from the rhizospheres of wheat and oats in Calvados and from other hosts.

RAMAKRISHNAN (T. S.). **Additions to fungi of Madras—X.**—*Proc. Indian Acad. Sci.*, Sect. B, 34, 2, pp. 63–72, 10 figs., 1951. [Received October, 1952.]

Further records from Madras in this series [cf. *R.A.M.*, 30, p. 389], which includes descriptions of eight new species, are *Phytophthora cinnamomi* causing large-scale infection on stems and roots of *Cinchona ledgeriana*, *C. succirubra* [cf. ibid., 30, p. 628], and other [*C.*] species at the Government Cinchona Plantations, Anamalais; *Empusa aphidis* [cf. ibid., 25, p. 262] on aphids (? *Macrosiphum solanifolii*) infesting buckwheat leaves at Nanjanad, Nilgiris; *Nectria diploa* [ibid., 30, p. 454] on [unspecified] scale insects infesting the stems and twigs of *Artocarpus integrifolia* [*A. integer*] at Pattambi, Malabar; *Sphaerostilbe aurantiicola* on *Mytilaspis* [*Lepidosaphes*] *beckii* [loc. cit.] infesting *Citrus reticulata* at Wynad, Malabar, and Singampati, Tinnevelly; and *Exobasidium vaccinii* [ibid., 28, p. 362], producing leaf galls on *Azalea indica* [ibid., 25, p. 152] (a new host record for India), and *Didymellina dianthi* in the conidial state only on carnation [ibid., 30, p. 560], both at Ootacamund. *Colletotrichum compactum* n.sp. on pods of *Albizzia lebbek* at Coimbatore is characterized by numerous black, intra-epidermal acervuli, later erumpent, a few brown, septate, unbranched setae 95 to 125 by 7 to 9 μ, and fusoid, arcuate, hyaline, unicellular conidia 20 to 38 by 3 to 5 (average 27 by 4) μ. *Septoria polygonicola* [ibid., 17, p. 13] occurred on living buckwheat leaves at Ootacamund.

FRASER (R. D. B.). **Infra-red dichroism of Tobacco mosaic virus nucleo-protein.**—*Nature, Lond.*, 170, 4325, p. 491, 2 graphs, 1952.

At King's College, London, measurements of the infra-red dichroism exhibited by tobacco mosaic virus nucleoprotein [cf. *R.A.M.*, 31, p. 302] in a concentrated gel on a silver chloride plate, by means of a 0·8 N.A. reflecting microscope in conjunction with a Grubb-Parsons spectrometer and a selenium film transmission polarizer, showed that the major component of the protein exists in the α- configuration with the chain axes perpendicular to the axis of the rod-shaped particle of the virus.

VIDALI (A.). **Esperienze di lotta contro l'oidio del Tabacco (Erysiphe cichoracearum) effetuate in campo a mezzo di carbonato di litio.** [Experiments on the control of Tobacco *Oidium* (*Erysiphe cichoracearum*) in the field by means of lithium carbonate.]—*Tabacco*, 56, 630, pp. 16–20, 1952.

The work dealt with in this paper has already been noticed from another source [*R.A.M.*, 31, p. 461].

HOLMES (F. O.). **Use of primary lesions to determine relative susceptibility of individual plants.**—Abs. in *Phytopathology*, 42, 2, p. 113, 1952.

Primary lesion methods are stated to be now applicable to the measurement of the concentrations of some 14 phytopathogenic viruses. For this purpose test plants are selected to be as uniformly susceptible as possible and variations in lesion counts are interpreted as denoting differences in virus concentrations. Reversal of this process and the use of inoculum of known infectivity enables variations in lesion counts to be utilized for the indication of differences in

susceptibility among individual plants. To test the susceptibility of plants that do not normally contract primary lesions a change of technique is required, as illustrated by recent studies of tomato plants derived from hybrids of low susceptibility to infection by tobacco mosaic virus [*R.A.M.*, 31, p. 520]. In this test accurate separation of plants of high from those of low susceptibility was effected by the substitution for ordinary tobacco mosaic virus, which does not induce visible primary lesions in tomato leaves, of a mutant strain designated 1952 D, producing necrotic primary lesions at the sites of inoculation. The number of such lesions depends on, and serves to determine, the relative susceptibility of individual plants to infection by the mutant and ordinary strains of the virus.

Caldwell (J.). **Some effects of a plant virus on nuclear division.**—*Ann. appl. Biol.*, 39, 1, pp. 98–102, 1 pl., 1952.

The effect of the aspermy virus [*R.A.M.*, 31, p. 463] on the formation of mega- and microspores in tomato plants was studied in the Department of Botany, University College, Exeter. The obvious interference by the virus with the normal meiotic processes suggests that this is the cause of the non-formation of seed in infected plants. It is further suggested that the interference with nuclear division may be more widespread and of greater biological significance than is realized at present.

Small (T.). **Tomatoes in Jersey.**—*J. Minist. Agric.*, 58, 12, pp. 576–579, 2 pl., 1952.

In this account of tomato-growing in Jersey, Channel Islands, where most of the crop is grown outdoors, the author states that in recent years removal of the lower foliage has occasionally been practised in an attempt to reduce infection by *Didymella lycopersici* [*R.A.M.*, 22, p. 378], *Botrytis* [? *cinerea*: ibid., 15, p. 690; 31, p. 463 and next abstract], and *Alternaria solani* [ibid., 15, p. 690]. Spraying is a costly item, but is indispensable as the crop is very susceptible to blight (*Phytophthora infestans*) [ibid., 17, p. 621; 19, p. 500]. Treatment often begins with young plants in the box stage, and twelve or more applications are not unusual, but losses from blight are rare. Dusts also are used.

Wheadon (E. A.). **Tomatoes in Guernsey.**—*J. Minist. Agric.*, 58, 12, pp. 580–583, 2 pl., 1952.

Tomato culture in Guernsey, Channel Islands, is mostly hothouse, few plants being grown outdoors. All propagating soil is steamed, and because of the prevalence of diseases, such as *Verticillium* wilt (*V. albo-atrum*) [*R.A.M.*, 20, pp. 93, 446], cropping soil also is sterilized with steam or formaldehyde. Where crops are grown in the 'floor', only the 'trenches' are steamed as a rule. The paths are left untouched for years. *V. albo-atrum* is, perhaps, the greatest enemy, but its progress into the steamed soil is usually checked by high spring temperatures before serious damage is done; in late, cold springs, however, incidence may be alarming. Experience has demonstrated that trenches must be sterilized every year if they are not to become so seriously infested that the subsequent crop is a failure. This method has been widely adopted and consistently good crops result.

After the fires are put out, about mid-June, the regular practice of overhead damping increases the danger of infection by *Cladosporium* [*fulvum*: cf. ibid., 15, p. 690] and *Botrytis* [? *cinerea*: see preceding abstract]. To forestall this all the leaves are removed up to 2 to 3 feet from the ground [cf. loc. cit.]. If *C. fulvum* appears panes of glass are removed from between alternate pairs of rafters at the front to improve the circulation of the air.

Ferguson (W.), Lyall (L. H.), & Racicot (H. N.). **Tomato breeding for resistance to Phytophthora infestans (Mont.) de By. I. Method of inoculation and preliminary results.**—*Sci. Agric.*, 32, 2, pp. 57–66, 1 pl., 1952.

Stokesdale, a tomato variety susceptible to blight (*Phytophthora infestans*) [*R.A.M.*, 30, p. 16; 31, p. 226 and cf. next abstract] in the field and heavily damaged under artificial infection in the greenhouse, was used in experiments for resistance started in 1948 at the Division of Horticulture, Central Experimental Farm, Ottawa, in co-operation with the Division of Botany and Plant Pathology, Department of Agriculture. A standard procedure was followed in the inoculation tests in which the plants were sprayed with a spore suspension of *P. infestans* at the rate of 55 ml. per flat and left in a moist chamber for at least five days. When examined for disease infection, the plants were classified from 0 (complete freedom) to 5 (complete killing). In the 1948–9 preliminary experiments Devon Surprise and *Lycopersicon peruvianum* subsp. *dentatum* were less injured than any other normal samples tested. The apparent resistance of the latter is probably mechanical due to the extremely pubescent character of the plants and fruit. *Solanum demissum* was practically immune with only a very few small lesions. Southland [ibid., 31, p. 462], reputed to have some resistance, and Carter's Sunrise, though showing slower development of the disease and less severe symptoms than the other varieties, could not be classed as resistant. Lakeland was susceptible. The Devon Surprise × Abel selection and the Tuckstir and Tuckcraig varieties developed only slight infection. A single plant of Philippine No. 2, grown from seed received from the Philippines in 1948, appeared to be immune. This tomato line is one of a number of strains known in the Philippines as Ilocano tomatoes, but has little horticultural value. In the 1949–50 experiments S_1 seedlings from the original Philippine No. 2 plant were fairly resistant but the S_2 generation was susceptible. S_2 seedlings of Philippine Nos. 4 and 5, both received subsequently, were quite resistant. In a comparative test of the Philippine selections and 13 varieties it was difficult to adhere to the usual schedule and it is possible that inoculation and infection were incomplete. However, only a trace to slight infection was observed on the S_1 and S_2 of Philippine No. 2, two S_2 lines of Philippine No. 4, Champion Original, *Solanum nigrum*, and *Cyphomandra betacea*, while Ailsa Craig, Berg's Special, Tuckqueen, Rutgers, Bison, and Break o'Day all showed moderate infection. Philippine Nos. 2 and 4 again proved outstanding.

Further testing is necessary to confirm the results of the above experiments which have been of a preliminary nature only.

Walter (J. M.) & Conover (R. A.). **Hereditary resistance to late blight of Tomato.**—*Phytopathology*, 42, 4, pp. 197–199, 1952.

Two accessions of small-fruited tomato plants (one perhaps *Lycopersicon esculentum* var. *pyriforme*) grown as ornamentals were observed to show a high degree of resistance to *Phytophthora infestans* in southern Florida [*R.A.M.*, 31, p. 542 and cf. preceding abstract]. The performance of hybrid populations resulting from crosses between these accessions and large-fruited, susceptible breeding stocks demonstrated the hereditary nature of the resistance. The observed segregation ratios and breeding results suggest that one main factor controls the reaction, with the intervention of one or more modifying factors.

Mackay (J. H. E.). **Fusarium wilt of Tomato—the effect of level of nutrition on disease development.**—*J. Aust. Inst. agric. Sci.*, 17, 4, pp. 207–211, 1952.

Experiments were carried out at the Division of Plant Industry, Canberra, to determine the effect of nutrition on the development of *Fusarium* wilt of tomatoes (*F. bulbigenum* var. *lycopersici*) [cf. *R.A.M.*, 28, p. 91]. In sand culture, using the

solution designated No. 1 by Hoagland and Arnon (*Circ. Calif. agric. Exp. Sta.* 347, 1938) and inoculating the plants by Mills and Hutton's technique [cf. *R.A.M.*, 26, p. 472] one month after sowing, as the level of the nutrients was increased, so the percentage of plants killed by the disease in a defined period fell, i.e., there was an increase in the interval before a defined percentage of plants died. No evidence was obtained that the addition of nutrients, even at the highest levels used, had any other effect than to postpone death [cf. ibid., 31, p. 581].

GREENSPAN (F. P.) & MACKELLAR (D. G.). **The application of peracetic acid germicidal washes to mold control of Tomatoes.**—*Food Tech., Champaign*, 5, 3. pp. 95–97, 1951.

Further information is given on the control of [unspecified] moulds on harvested tomatoes by treatment with a 0·3 per cent. solution of per[oxy]acetic acid [*R.A.M.*, 30, p. 336], which may be applied either by spraying or dipping.

In laboratory tests at the Buffalo Electro-Chemical Company, Inc., Buffalo, New York, the concentrations of peroxyacetic acid required to kill *Aspergillus niger* [ibid., 31, p. 26] and *Penicillium roqueforti* in ten minutes were 0·005 in phosphate buffer and 0·05 in nutrient broth.

BAXTER (D. V.). **Some resupinate polypores from the region of the Great Lakes. XXII.**—*Pap. Mich. Acad. Sci.*, 36, (*1950*), Part I, pp. 69–83, 8 pl., 1 diag., 1952.

In a further study in this series [cf. *R.A.M.*, 31, p. 215] notes are given on the taxonomy, macro- and microscopic characters, habitat, geographical distribution, and occurrence of *Polyporus licnoides* [ibid., 3, p. 692; 14, p. 795] on southern hardwoods and *Lenzites sepiaria* [ibid., 31, pp. 154, 155, 526], which is one of the most abundant fungi on dead coniferous timber in North America [ibid., 30, p. 594], being particularly destructive on exposed service timber, especially poles, posts, and ties [ibid., 29, p. 446]. It also attacks living, standing trees under certain favourable environmental conditions and was at least a contributory cause of decay in standing green jack pine [*Pinus banksiana*] in the Nebraska National Forest in 1949, infecting sunscald areas incurred after pruning. Pruned trees exposed to the sun at the edge of a plantation are susceptible to attack; weakened by the rot they eventually break, exposing those behind; thus many stands will eventually be totally destroyed. *P. ponderosa* is protected from scald by its thick bark and has not been infected by *L. sepiaria* through pruning wounds.

The cultural characters of *L. sepiaria*, enzyme production, reaction to chemicals and heat, and prevention and control are reviewed.

WENT (J[OHANNA] C.). **Verslag van de onderzoekingen over de Iepenziekte en andere boomziekten, uitgevoerd op het Phytopathologisch Laboratorium 'Willie Commelin Scholten' te Baarn in 1951.** [Report of the investigations on the Elm disease and other tree diseases carried out at the Phytopathological Laboratory 'Willie Commelin Scholten', Baarn, in 1951.]—*Meded. Inst. toegep. biol. Onderz. Nat.* 47, 5 pp. [? 1952. English summary. Mimeographed.]

Weather conditions in Holland during 1951 were unpropitious for the development of elm disease [*Ceratostomella ulmi*: *R.A.M.*, 31, p. 151], only very susceptible varieties and seedlings contracting infection. The resistance of the selections *Ulmus hollandica vegeta*×*U. carpinifolia* (No. 148) and *U. wallichiana*×*U. carpinifolia* No. 1 (No. 248) was maintained, but their liability to attack by *Nectria cinnabarina* [loc. cit.] requires further investigation.

The incidence of the *Leptothyrium* disease of spruce [ibid., 31, p. 152] appears to be declining.

Grisvard (P.). **Les arbres d'ombrage de la région parisienne : considérations sur leur comportement.** [Shade trees in the Paris area: a survey of their condition.]—*Jardins de Fr.*, Sér. 7, 6, 47, pp. 175–183, 2 diags., 1952.

This is a general survey of problems regarding the condition and maintenance of shade trees in and around Paris with reference to atmospheric pollution, light and aeration, soil and subsoil, parasitic diseases, and the distribution of each tree species.

The disease most recently introduced is the so-called 'soot' of sycamores (*Acer pseudoplatanus*) discovered in Paris for the first time in 1947 and taking its name from the multitudes of minute black spores produced beneath the withered bark [cf. *R.A.M.*, 31, pp. 304, 580]. It is gaining ground so rapidly that all sycamore trees may be affected before a remedy is found. The pathogen, *Eutypa acharii* [but see loc. cit.], appears to be carried in the soil, judging by the speed with which a row of trees is attacked. Up to the present no other species of *Acer* are known to be affected.

Wilt of *Ailanthus*, due to *Verticillium dahliae* [ibid., 18, p. 826], known in Paris since 1890, has reduced the percentage of this species from 12 to 0·5, the few survivors being in very poor condition. Planes [*Platanus* spp.] are attacked periodically by anthracnose (*Gnomonia veneta*) [*G. platani*: ibid., 29, p. 184; 31, p. 408] following long dry spells. The removal of affected branches affords temporary protection to other parts of the tree until the weather breaks.

Krstić (M.). Рак Кестенове коре утврђен је код нас й на Храсту. [Chestnut-bark canker confirmed on Oak in our country.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 10, pp. 83–84, 1 fig., 1952. [French summary.]

At Panovetz near Goritza, Yugoslavia, *Endothia parasitica* was detected in 1951 on eight English oak stem offshoots eight to 12 years old [*R.A.M.*, 30, p. 550 and next abstract]. The mycelium was concentrated mostly in the inner layers of the bark but in some cases the bark was completely destroyed. Some of the infected samples had none of the characteristics peculiar to *Quercus sessiliflora* [*Q. petraea*] and the examination of the leaves suggests a hybrid, between it and *Q. pedunculata* [*Q. robur*]. On further investigation another 12 English oaks have been found affected and severe suppressive measures have been taken.

Krstić (M.). **Konferencija šumarskih stručnjaka po pitanju raka Kestenove kore u Sloveniji.** [Forestry experts conference on the problem of Chestnut bark canker in Slovenia.]—*Zasht. Bilja* [*Plant Prot., Beograd*], *1952*, 9, pp. 107–108, 1952.

At the forestry conference held at Ljubljana, Yugoslavia, in December, 1951, control measures against chestnut bark canker (*Endothia parasitica*) [*R.A.M.*, 31, p. 463] were reviewed and discussed. It was decided that the quarantine service concerned with the use and transport of the diseased material and fruit should be even more restrictive, all diseased off-shoots from stumps destroyed, and the stumps prevented from producing new shoots. A commission, dealing with this problem only, was set up, and a more stringent inspection of chestnut trees extended to other parts of the country, Istria in particular. Similar control is recommended against *E. parasitica* on oak [see preceding abstract].

Waterman (Alma M.) & Aldrich (K. F.). **Surface sterilization of Poplar cuttings.** —*Plant Dis. Reptr*, 36, 5, pp. 203–207, 1952. [Multilithed.]

Experiments were carried out at the Division of Forest Pathology, New Haven, Connecticut, during 1951 and 1952 to find out whether surface sterilization of healthy, dormant poplar cuttings would prevent spore germination of parasitic fungi. Examination of healthy buds showed that the spores of *Septoria musiva* [*R.A.M.*, 31, p. 260] and *Septotinia populiperda* [ibid., 30, p. 130] could remain

viable for some time on the resinous bud scales. Viable spores of the former were also found in the lenticels. Hot-water treatments were discontinued as 50° C., which would be fungicidal, was lethal to some of the clones. Cuttings from a tree infected with *S. populiperda* were sprayed with a suspension of mixed spores of *Septoria musiva* and *Dothichiza populea* [ibid., 31, p. 260]; germinated spores of all three fungi were later observed in the resinous coating of the bud scales. After dipping in 0·1 per cent. mercuric chloride in 70 per cent. alcohol mycelium characteristic of *Septotinia populiperda* only was observed. Two cuttings of each of 15 clones were sprayed with a water suspension of mixed spores of the three fungi and when partially dry were wrapped in waxed paper and stored at 40° F. for three or four days. They were then dipped individually in various solutions, wrapped in waxed paper, and re-stored. No isolations of parasitic fungi were obtained from lenticels and buds of cuttings dipped for four seconds or two or five minutes in 5 per cent. mercuric chloride in 70 per cent. alcohol without rinsing, and only one or two isolations from those dipped in the solution for five minutes and then rinsed in water. In cuttings dipped 2 or 5 minutes and stored, the phytotoxic effect of the mercuric chloride may extend for more than half an inch from the cut surface. In no test was complete sterilization obtained; colonies typical of *D. populea* did not appear in any of the cultures but a species of *Phomopsis* [ibid., 18, p. 68], normally abundant on cankers caused by *Septoria musiva*, was frequently isolated from the buds and lenticels of treated cuttings. For the satisfactory control of the spores of parasitic fungi dipping dormant cuttings individually for 4 or 5 seconds in 5 per cent. (saturated) mercuric chloride in 70 per cent. alcohol without rinsing is recommended, and shipping immediately or storing at a low temperature, removing half an inch from each end of the cutting before planting. This treatment had no toxic effect on cuttings planted in the greenhouse.

Miller (P. R.) & Gravatt (G. F.). **The Sweetgum blight.**—*Plant Dis. Reptr*, 36, 6, pp. 247–252, 6 figs., 2 maps, 1952. [Multilithed.]

A description is given of a blight of sweet gum (*Liquidambar styraciflua*) [cf. *R.A.M.*, 29, p. 66], a new disease first observed in 1948 at University Park, Prince George's County, Maryland (*Plant Dis. Reptr*, 35, pp. 295–297, 1951). There is remarkable regularity in the decline and death of the affected trees after the first symptoms, i.e., premature reddening or yellowing of the leaves on affected limbs, which may die the following spring. Thinness of the foliage throughout the tree, dead tips, and gradually drying small leaves on some of the limbs are characteristic of the disease. Sometimes the small-leaved branches may gradually wilt or dry up or the leaves colour while the terminal buds remain green and normal in appearance for a while but not opening. The affected branches anywhere on the periphery of the crown or leader usually die during the summer, often leaving black areas in the bark. The leader of the tree is usually affected first (in dense forest stands as a rule), symptoms developing later down the tree. In the sapwood of affected branches and tops are amber-brown to deep brown streaks. A few or numerous, narrow streaks or bands of discoloration appear sometimes in the upper part of the trunk while the heartwood is the normal colour. About 20 per cent. of the 3,000 sweet gums in the park are affected and the disease is confined to trees larger than 1 in. diameter. Similar symptoms have been observed in other parts of Maryland and in Virginia.

Mikola (P.). **Effect of forest humus on parasitic fungi causing damping-off disease of coniferous seedlings.**—*Phytopathology*, 42, 4, pp. 202–203, 1952.

Pure culture studies were conducted in the Soils Department, University of Wisconsin, to test the validity of previous observations as to the reduction of damping-off in conifer seedlings by soil amendments with acid peat and humus [*R.A.M.*, 18, p. 561]. Pots containing a mixture of equal parts of quartz sand and

outwash surface sand (pH 5·65), infested primarily by *Pythium irregulare* and *Rhizoctonia* [*Corticium*] *solani* [ibid., 23, p. 197; 31, p. 411], were treated at 0·8, 1·6, and 3·2 per cent. by weight (dry) with three types of shredded duff humus (pH 5·2 to 5·5) collected from virgin stands of white pine—red pine, hemlock—yellow birch, and beech and sown with jack pine [*Pinus banksiana*] seeds (50 per pot) in December, 1950. After 30 days all surviving seedlings were removed and the soils resown with pine seed, this procedure being repeated twice. The average survival for the four sowings in the untreated soil was 23 to 42 per cent. compared with 47 to 73, 56 to 84, and 48 to 71, for those amended with the highest weights of the three types of humus, respectively.

The possibility that forest humus might harbour antibiotic substances was investigated by growing *P. ultimum* and *C. solani* in synthetic media [ibid., 25, p. 518] with and without the addition of humus extracts. Less than 5 ml. of the extracts per culture did not inhibit the growth of either species, the development of *C. solani* being stimulated at a concentration of 5 ml. extract per 10 ml. nutrient solution, whereas that of *P. ultimum* was retarded by the same treatment.

It would appear from these results that the observed moderation in the intensity of damping-off by soil treatment with forest humus is due in the first place to the release of readily available nutrients that strengthen the young root tissue and so curtail the period of susceptibility to the disease.

Rishbeth (J.). **Control of Fomes annosus Fr.**—*Forestry*, 25, 1, pp. 41–50, 1952.

After briefly describing the life-history of *Fomes annosus*, causing butt-rot of conifers [*R.A.M.*, 31, p. 262], and discussing existing control methods, the author presents the results of experiments in East Anglia which, taken together, showed that after painting stump surfaces with protective paint immediately upon felling there was 2 per cent. infection one year later, compared with 27 per cent. in the untreated; 6 per cent. followed creosoting, against 38 per cent. in the untreated, the figures for tar-creosoting [ibid., 30, p. 591] and untreated being 2 and 18 per cent., respectively. The average cost of application was approximately £1. 16*s*. per acre.

Wedge inoculations with *Peniophora gigantea* [loc. cit.] reduced infection by *F. annosus* from 15 to 5 per cent. In another test stumps cut the day before were given wedge inoculation with *P. gigantea* or sprayed with a spore suspension of the fungus, one-half of each series of treated and untreated stumps then being further sprayed with a spore suspension of *F. annosus*. A year later the stumps treated with *F. annosus* spores only had 78 per cent. infection (18 stumps), those given in addition *P. gigantea* wedges had 47 per cent. infection (17 stumps), and those given *P. gigantea* spores instead of wedges had 13 per cent. infection (15 stumps). It is concluded that once *F. annosus* has become established in the roots spread into stumps cannot be prevented by surface protectants or by any method of biological control.

Blew (J. O.), Richards (C. Audrey), & Baechler (R. H.). **Evaluating wood preservatives.**—*Prepr. For. Prod. Res. Soc.* 143, 10 pp., 1951.

In this report the authors discuss some recognized methods used in evaluating wood preservatives in laboratory and field [cf. *R.A.M.*, 31, p. 311, *et passim*], the points dealt with covering tests of permanence (including volatility, leachability, and chemical stability), penetrability, safety in use, effects on wood and metal, fire retardance, paintability, water repellance, and biological assays, accelerated field tests, and service tests. It is concluded that as laboratory and accelerated field tests of wood preservatives fail to take adequately into consideration the combination of exposure conditions surrounding wood in service, they are not a satisfactory substitute for service tests. Precautions should be taken in all wood preservative tests to ensure that the tested specimens and their method of preparation give representative results.

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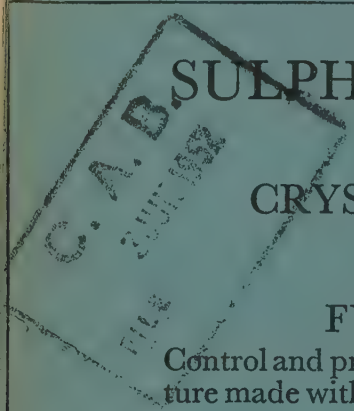

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